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ANNOUNCEMENT OF THE TWENTY-SECOND SUMMER SESSION JULY 7-AUGUST 15 1913

MARCH 15, 1913
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ITHACA, NEW YORK

This announcement is intended to give detailed information to prospective students in the Summer Session of Cornell University.

For general information concerning the University and the work in its various colleges during the academic year, the requirements for admission, etc., the General Circular of Information should be consulted. This and the other Official Publications of Cornell University are listed on the last page of the cover of this pamphlet. Any one of the informational publications there mentioned will be sent gratis and post-free on application to the Secretary of Cornell University, Ithaca, New York.

CALENDAR
SUMMER SESSION 1913

In order to get the full number of exercises announced for the Summer Session, it is necessary that all work begin promptly on Monday morning, July 7. Students are therefore urged to reach Ithaca in time to be present at the first exercises in each class. If possible, they should register on Saturday, July 5; if not, they should register on Monday during the hours not occupied in class work.

July 5, Saturday,	9 a. m. to 5 p. m. Registration at office of Registrar.
July 7, Monday,	Instruction begins at times and places announced under each course. Registration continued.
July 8, Tuesday evening, and following Tuesdays,	Musical Recital, Sage Chapel. The Director of the Summer Session will make a brief address.
July 9, Wednesday evening, and following Wednesdays,	Departmental Conferences.
July 10, Thursday evening, and following Thursdays,	Musical Recital, Sage Chapel.
July 12, Saturday before 1 p. m.	Last day for payment of fees at the Treasurer's Office, 1 Morrill Hall. Excursions as announced in the weekly calendar.
July 14, Monday evening,	First Lecture in Monday evening course. Continued on following Mondays. Rockefeller Hall.
August 14, 15, Thursday and Friday,	New York State Examinations for Teachers' Certificates.
August 15, Friday,	Summer Session closes.

A weekly calendar is published by the University. During the Summer Session it will be mailed to any address on receipt of twenty-five cents at the Secretary's Office.

CALENDAR
ACADEMIC YEAR 1913–14

September 12, Friday,	Entrance examinations begin.
September 22, Monday,	Academic year begins. Registration of new students. Scholarship examinations begin.
September 23, Tuesday,	Registration of new students.
September 24, Wednesday,	Registration of old students.
September 25, Thursday,	Instruction begins. President's annual address to the students.

CORNELL UNIVERSITY, SUMMER SESSION 1913

OFFICERS

Thomas Frederick Crane, Litt.D., Acting President of the University.
George Prentice Bristol, A.M., Director of the Summer Session.
David Fletcher Hoy, M.S., Registrar of the University.

FACULTY

Arthur J. Abbott, Director of Music, Buffalo.	Music
Joseph Quincy Adams, jr., Ph.D., Assistant Professor of English.	English
Arthur Augustus Allen, Ph.D., Instructor in Zoology.	Zoology
Ross Peter Anderson, Ph.D., Instructor in Chemistry.	Chemistry
Albert LeRoy Andrews, Ph.D., Instructor in German.	German
Elmer James Bailey, Ph.D., Instructor in English.	English
John Bauer, Ph.D., Assistant Professor of Economics.	Economics
Charles Edwin Bennett, Litt.D., Professor of Latin.	Latin
William Betz, A.M., Head of Department of Mathematics, East High School, Rochester.	Mathematics
Ernest Blaker, Ph.D., Assistant Professor of Physics.	Physics
Smiley Blanton, B.S., Sometime Instructor in Oratory.	Public Speaking
Albert William Boesche, Ph.D., Assistant Professor of German.	German
Julian Pleasant Bretz, Ph.D., Professor of American History.	History
Leslie Nathan Broughton, Ph.D., Instructor in English.	English
Harry Phillips Brown, A.M., Instructor in Botany.	Botany
Arthur Wesley Browne, Ph.D., Professor of Chemistry.	Chemistry
Laura Bryant, Director of Music, Ithaca Public Schools.	Music
Earle Nelson Burrows, C.E., Instructor in Civil Engineering.	Engineering
Walter Butterfield, Director of Music, Manchester, N. H.	Music
Lane Cooper, Ph.D., Assistant Professor of English.	English
George Irving Dale, A.B., Instructor in Romance Languages.	Spanish
Hollis Dann, Mus.D., Professor of Music.	Music
Hermann Davidsen, Ph.D., Assistant Professor of German.	German
Merritt James Davis, Assistant in Chemistry.	Chemistry
Charles DeGarmo, Ph.D., Professor of Education.	Education
Edgar Arnold Doll, A.B., The Training School, Vineland.	Education
Arthur Johnson Eames, Ph.D., Instructor in Botany.	Botany
Harley L. Edick, Teacher in State Normal School, Cortland.	Manual Training
William Henry Elson, A.M., Sometime Superintendent of Schools, Cleveland, Ohio.	Education
Ellsworth David Elston, A.B., Assistant in Geography.	Geography
Mable D. Ely, Head of Department of Drawing and Art, High School of Commerce, Cleveland, Ohio.	Drawing and Art
George Abram Everett, A.B., Assistant Professor of Oratory.	Public Speaking
Gail J. Fink, A.B., Assistant in Chemistry.	Chemistry
William Silliman Foster, A.B., Assistant in Psychology.	Psychology
Roswell Clifton Gibbs, Ph.D., Assistant Professor of Physics.	Physics
David Clinton Gillespie, Ph.D., Assistant Professor of Mathematics.	Mathematics
Ralph J. Gilmore, A.M., Instructor in Zoology.	Zoology
Pierre F. Giroud, Licencié ès Lettres, Lecturer, Johns Hopkins University.	French
Maurice Hope Givens, Ph.B., Instructor in Physiology.	Physiology
J. Earl Griffith, Head of Department of Drawing and Art, Central High School, Newark, N. J.	Drawing and Art
Clarence Frederick Hale, Ph.D., Professor of Physics, State Normal College, Albany.	Physics and Chemistry
John J. Hayes, Teacher of Singing, New York City.	Music
Arthur Romaine Hitch, A.B., Assistant in Chemistry.	Chemistry
Emmet Francis Hitch, Ph.D., Instructor in Chemistry.	Chemistry
Leroy Hooper, Foreman of Wood Shop.	Manual Training

Burdette Newton Howe, Assistant in Shop Work. Manual Training
Andrew Hunter, M.A., Assistant Professor of Biochemistry. Physiology
Wallie Abraham Hurwitz, Instructor in Mathematics. Mathematics
Edward F. Johnston, University Organist. Music
Edwin Walter Kemmerer, Ph.D., Professor of Economics, Princeton University. Economics
Dexter Simpson Kimball, A.B., Professor of Machine Design. Industrial Education
Burton Judson Lemon, Ph.D., Instructor in Chemistry. Chemistry
Gustav E. F. Lundell, Ph.D., Instructor in Chemistry. Chemistry
William Edward Lunt, A.M., Professor of European History. History
Samuel A. Mahood, M.A., Assistant in Chemistry. Chemistry
Joseph Vance McKelvey, Ph.D., Instructor in Mathematics. Mathematics
James Frederick Mason, Ph.D., Assistant Professor of Romance Languages. French
Peter A. vander Meulen, B.Chem., Assistant in Chemistry. Chemistry
Benton Sullivan Monroe, Ph.D., Assistant Professor of English. English
Frederick Monteser, Ph.D., Head of Department of German, DeWitt Clinton High School, New York City. German
Richard Alan Mordoff, B.S.A., Assistant in Geography. Geography
Everett Ward Olmsted, Ph.D., Professor of Romance Languages. French
William Ridgeley Orndorff, Ph.D., Professor of Organic Chemistry. Chemistry
Frederick William Owens, Ph.D., Instructor in Mathematics. Mathematics
Irving Perrine, Ph.D., Professor of Geology, University of Oklahoma. Geology
Miles Albion Pond, Ph.B., Assistant Professor of Civil Engineering. Descriptive Geometry
Paul Russell Pope, Ph.D., Assistant Professor of German. German
Ralph W. Powell, B.S. in C.E., Instructor in Civil Engineering. Mechanics
Harry Westfall Redfield, Ph.D., Instructor in Chemistry. Chemistry
Hugh Daniel Reed, Ph.D., Assistant Professor of Zoology. Zoology
Ernest William Rettger, Ph.D., Assistant Professor of Applied Mechanics. Mechanics
Floyd Karker Richtmyer, Ph.D., Assistant Professor of Physics. Physics
Harold Eaton Riegger, A.B., Assistant in Chemistry. Chemistry
Willard Winfield Rowlee, D.Sc., Professor of Botany. Botany
Christian Alban Ruckmich, A.M., Instructor in Psychology. Psychology
Elsie Sameth, A.B., Director of Physical Education, University of Nevada. Physical Education
Francis Joseph Seery, B.M.S., Assistant Professor of Civil Engineering. Hydraulics
Francis Robert Sharpe, Ph.D., Assistant Professor of Mathematics. Mathematics
John Sandford Shearer, Ph.D., Professor of Physics. Physics
Clarence McKinlay Sherwood, A.B., Assistant in Chemistry. Chemistry
Virgil Snyder, Ph.D., Professor of Mathematics. Mathematics
Newton Swift, Teacher of Piano and Theory, Boston, Mass. Music
Thomas Tapper, Lecturer, Institute of Musical Art, New York City. Music
Leonard Church Urquhart, C.E., Instructor in Civil Engineering. Engineering
James Elijah Vanderhoef, Foreman in Foundry. Manual Training
Oscar Diedrich von Engeln, Ph.D., Assistant Professor of Geography. Geography
Harry Porter Weld, Ph.D., Assistant Professor of Psychology. Psychology
Albert Edward Wells, Superintendent of Shops. Industrial Education
Thomas W. B. Welsh, Ph.D., Instructor in Chemistry. Chemistry
Guy Montrose Whipple, Ph.D., Assistant Professor of Education. Education
Ray Hughes Whitbeck, A.B., Associate Professor of Physiography and Geography, University of Wisconsin. Geography
Bernice White, Teacher of Music in the Normal College, New York City. Music
John Tamsh Williams, Assistant Professor of Machine Design. Industrial Education
Wilford Murray Wilson, M.D., Professor of Meteorology. Meteorology
Harry Elmsley Wood, Director of Manual Training, Indianapolis, Indiana. Industrial Education
Wesley Daniel Zinnecker, Ph.B., Instructor in German. German

OBJECT OF THE SUMMER SESSION

The primary object of the Summer Session is to advance education by helping those engaged in it. The instruction is adapted to the needs of the following classes:

1. Professors and teachers in colleges and schools, superintendents, and supervisors of special branches of instruction.

The announcements of the different departments show a wide range of work. This work is either advanced and, therefore, suited for specialists who wish to pursue their individual study, or more elementary and adapted to teachers who desire to start in a new field. In addition to the instruction of the class room, the University's libraries, laboratories, and shops are open for use. For superintendents and supervisors, there are also courses in administration, and in general and special methods, besides lectures on educational philosophy and theory.

2. College students in Cornell or other universities who wish to use some of the "long vacation". In the case of graduates some of the work offered may be counted toward an advanced degree. Undergraduates may anticipate work and thereby shorten their course, or may make up existing deficiencies. The conditions for receiving credit, and the amount which may be obtained, are stated on pages 6, 7.

3. Students entering the University and wishing to obtain surplus credit at entrance, or to complete the entrance requirements. It often happens that students have in June more or less than the requirements for admission to college. The Summer Session affords them the opportunity either to add to their surplus and thus, in some cases, to gain a year in time; or to make up their deficiency.

4. All persons qualified to pursue with profit any course given, whether or not they are engaged in study or teaching.

STATISTICS OF ATTENDANCE, 1912

The whole number enrolled in the Summer Session of 1912 was 1053 (599 men and 454 women), representing 48 states and territories and 25 foreign countries. Of this number 405 were students during the previous winter; 437 were persons engaged in teaching, of whom 30 were teachers in colleges, 10 in normal schools, 166 in high schools, 135 in grammar schools, 15 in private schools, and 81 were supervisors or superintendents.

ADMISSION, ATTENDANCE, REGISTRATION

There is no examination for admission to the Summer Session. Each person must, however, satisfy the instructor in charge of any course (unless it be elementary) that he is qualified to pursue the work. Any duly registered student of the Summer Session may visit such classes as he desires. **Admission to the class rooms is restricted to duly registered students.** Persons wishing to have work done during the Summer Session counted towards an advanced degree, must conform to the regulations stated under the heading "Credit for Work", page 6.

All students are required to register at the office of the Registrar in Morrill Hall. They may register on Saturday, July 5th, between 9 a. m. and 5 p. m., or

upon the day of their arrival, if they reach Ithaca later than July 5th. Registration on July 5th is urged. Class exercises begin at 8 a. m. Monday, July 7th. The Registrar's office is open from 9 a. m. to 4 p. m. every day except Saturday, when it is closed at noon.

TUITION FEE

The single tuition fee for the entire Summer Session, whether one course or more be taken, is $30. This must be paid at the office of the Treasurer, Room 1, Morrill Hall, within five days after registration day. In case of withdrawal, within five days from the first registration day, for reasons satisfactory to the Treasurer and the Registrar, the tuition paid may be refunded and the charge cancelled. In case of withdrawal within two weeks after the first registration day, one-half the tuition may be refunded. In case of registration after the first three weeks of the session, students must pay two-thirds of the full tuition fee. No student is admitted without the payment of this fee. Sibley College students taking shop work are not exempted. Admission to classes is restricted to duly registered students.

LABORATORY FEES

Chemistry. A fee is charged for material actually consumed, and such deposit must be made with the Treasurer as the instructor may prescribe.

Physics, Botany, Physiology. In each of these departments the fee for each term or part thereof is at the rate of $1 for every five hours a week of work in the laboratory. The entire amount must be paid to the Treasurer at the beginning of the term.

Geography and Geology. For course B, and D in geography a fee of $1 must be paid in advance to the Treasurer to cover incidental expenses of the course.

Shopwork. The fee for shopwork is at the rate of $1.50 for every fifty hours spent in the shops. This must be paid in advance to the Treasurer. Students registered in Sibley College during the previous year are not required to pay this fee.

Zoology. See courses under Zoology, page 47.

Library Deposit. See under Library, page 8.

ACADEMIC CREDIT FOR WORK

In the College of Arts and Sciences. The requirements for the degree of Bachelor of Arts are residence for eight terms (four years), and the completion of one hundred twenty hours ("points") of elective work. A student who has satisfied the entrance requirements of the College, and has afterward completed in two or more summer sessions at least twelve hours of work in courses approved by the departments concerned, may be regarded as having thus satisfied one term of residence. Under no circumstances shall work done in summer sessions be accepted as the equivalent of more than two terms of residence. The maximum amount of credit towards the A.B. degree which is allowed for the work of any one summer session is seven hours.

In other Colleges of the University. The nature and amount of credit allowed in these for summer session work may be learned from the statements under the announcement of each course.

In the Graduate School. Graduate work at Cornell is not expressed in terms of courses or hours. A graduate of any college whose requirements for a first degree are substantially equivalent to those for the first degree at Cornell may be admitted to resident study in the Graduate School. He may be admitted to candidacy for an advanced degree upon the recommendation of the professors under whom he proposes to work. The conferring of the degree itself does not depend primarily on the completion of any prescribed number of courses or of a fixed term of residence. It involves the writing of a thesis and the passing of a special final examination. The minimum period of residence for the Master's degree is one academic year or its equivalent, and for the Doctor's degree three years.

Not all work done by a graduate student is graduate work in the strict sense of the term. Graduate work to be considered as work for a degree must be of advanced character in some field or department of knowledge.

Graduate work toward an advanced degree may be done during the Summer Session under the following conditions: it must be done under the direction of a member of the Faculty of the Graduate School, after the student has entered the Graduate School and is admitted by the Dean of the School as a candidate for an advanced degree. The residence requirement for the Master's degree may be satisfied by study during five Summer Sessions, or by study during one-half the academic year and in three Summer Sessions.

The graduate work offered in the summer of 1913 may be learned from the departmental announcements. Not all departments offer graduate work.

Any person wishing to become a candidate for an advanced degree and to study during the Summer Session should write to the professor whose work he expects to take, and also to the Dean of the Graduate School, asking for a blank form of application for admission to the Graduate School. It is much better to make these arrangements before coming to Ithaca, thus avoiding delay and interruption of study after the Summer Session has begun.

Certificates for Work Done. Students of the Summer Session who are not matriculated in the University may receive certificates of attendance and of work satisfactorily performed. Application for them must be made before August 15, and the applicant must leave at the office of the Registrar a large sized envelope stamped and directed to his home address. The certificate will then be forwarded by mail. The regulations of each department for the granting of a certificate must be met.

The Department of Education of New York City will, in certain subjects, accept these certificates instead of requiring examinations for licenses.

COST OF LIVING

The cost of board and furnished room in Ithaca during the Summer Session runs from $5.50 a week upwards. In some cases the cost has been reduced to $5 but it is not safe to count upon less than this sum.

The price of a single furnished room may be as low as $1.50 a week. The prices advance with the size and location of the rooms.

Rooms are engaged with the understanding that they will be occupied for the entire session, unless otherwise agreed upon by both parties. Table board is usually engaged by the week, or, if so stated, by the day.

The price of table board runs from $4 and $4.50 in boarding houses, to $7 and $10 at the hotels.

The University has one residence hall, the Sage College, with an annex, Sage Cottage. This will as heretofore be opened for women throughout the Summer Session. It is impossible to say at the time of publication whether the Cottage can be used in 1913. If it can be used, it will be reserved for students registered in the Department of Music. As the great majority of the persons living in these buildings are attending the University for serious work, it is necessary that the rooms and halls should be quiet during the hours of rest. Persons unwilling to conform to reasonable regulations for securing this quiet are not wanted in the buildings. The price of rooms in Sage College is from $1.25 to $5.50 a week, according to location, and of table board $5.00. The capacity of the building is usually engaged in advance, and early application is therefore advisable.

This should be made to the Manager of Sage College, Ithaca, New York. Every application for a room to be reserved must be accompanied by a deposit of $5, otherwise the application is not registered. The amount of this deposit is deducted from the rent if the room assigned be occupied by the applicant; it may be refunded if the applicant gives formal notice to the manager on or before June 15th that she desires for good reasons to withdraw the application altogether.

Without permission from the Director of the Summer Session no one will be allowed to room in Sage College or Sage Cottage during the summer unless registered in the Summer Session.

The whole expense of attendance at the Summer Session, not including laboratory fees, may be estimated at $80 to $100.

THE LIBRARIES

The University Library is open on week days from 9 a. m. to 10 p. m., except Saturday, when it closes at 1 p. m. In this are housed the main library, containing about four hundred thousand volumes, and most of the seminary and special libraries. The main reading room affords accommodations for over two hundred readers, and contains a selected library of over 8,000 volumes of reference works. Adjacent to it is the periodical room in which are kept the current numbers of about five hundred journals in various fields of knowledge. These rooms are open to all students. Students properly qualified are allowed the use of the seminary rooms and of the books in them. The main collection is primarily a library of reference for use in the building. Students are, however, allowed to a limited extent to take out books for home use. Persons wishing this privilege must make a deposit of $5, which will be refunded upon the return of all books taken out. Special libraries of chemistry, in Morse Hall, and of anatomy and physiology, in Stimson Hall, are open to students in these departments.

LECTURES, MUSICAL RECITALS, EXCURSIONS

In addition to the regular class room work there will be public lectures on Monday evenings.

In addition to these there are lectures of general interest each week in connection with the various departments. Notice of these will be given in the University Calendar.

Musical recitals will be given on Tuesday and Thursday evenings in the Sage Chapel.

Wednesday evenings are devoted to the departmental conferences which are open to all interested. Notice of these will be given from week to week. In connection with the work of several departments excursions are made to many points of interest. Most of these are open to members of the Summer Session.

An informal reception will be held on some evening at the beginning of the Summer Session. This, it is hoped, will assist students in the Summer Session in becoming acquainted with the members of the staff of instruction and with each other.

RAILROAD ROUTES AND RATES

Ithaca is reached by either the Lehigh Valley or the Lackawanna railroad. By the latter, a branch leaves the main line at Owego. Through trains run from New York and Buffalo on the Lehigh, and through sleeping cars run daily from New York on both roads. From Philadelphia, Baltimore, Washington, and the South, via the Baltimore & Ohio, the Philadelphia & Reading connects with the Lehigh at Bethlehem. On the Lehigh, through trains for Ithaca connect with the New York Central at Auburn, and with the Pennsylvania (Northern Central) and the Erie at Elmira.

From nearly all important points in the Middle and Atlantic Coast States summer excursion tickets may be purchased to Ithaca. From central and western states it is generally possible to buy excursion tickets to Niagara Falls, in case an excursion rate to Ithaca is not available.

At the time this pamphlet goes to press it is not possible to give specific rates. Persons interested should, some time in advance of their departure, make inquiry of the railroad agent at their home town. If full information cannot be obtained in this way, write to the Director of the Summer Session, Ithaca, New York.

COURSES OF INSTRUCTION

Most of the courses offered consist of five exercises a week, each week day except Saturday. The number of actual hours of class work in any course may be found by multiplying the weekly exercises by six.

The word "hour" used in speaking of University credit means the equivalent of one class exercise a week for a half year. One hundred and twenty such "hours" are required of candidates for the A.B. degree.

(G. S. = Goldwin Smith Hall.)

EDUCATION

Courses A, B, and C will be found especially helpful to college graduates who are preparing for examination in professional subjects as outlined in the New York State Syllabus and Course of Study for the renewal of the College Graduate Certificate Limited. The State Education Department will hold an official examination for such candidates at Ithaca, August 14 and 15. Since it is permissible to do so, those who can should prepare for examination in two subjects this summer and for the remaining two a year later.

A. **Principles of Education.** Lectures, discussions, and textbook study. Professor DEGARMO. Except Sat., 11. G. S. 142. Credit, two hours.

This course is designed to be an introduction to the general theory of education, and falls into three distinct parts, the first pertaining especially to education as an agency for securing individual and social progress; the second, to the school studies, their value and their organization into curricula for cultural and for vocational ends; and the third, to the scientific methods of teaching them. The following are some of the leading topics: educational aspects of prosperity; health; political and economic democracy; home life; race improvement; social adjustment and individual and social progress; the social and the individual basis of education; the basis for the selection of studies; their classification; their function and relative educational worth; the mental discipline that each should furnish; the organization of the studies into curricula; the correlation of high-school studies; general vs. vocational courses of study; scientific basis for high-school methods; function of authority, observation and experiment, of hypothesis and analogy in getting and explaining facts; nature and function of the 'problem'; nature and place of induction and deduction in teaching; the means for securing efficiency; function of the laboratory and workshop; heuristic methods; German methods. Textbooks: DeGarmo's Principles of Secondary Education, vols. I and II; collateral reading: Principles of Education by Henderson, by Bolton, and by Roediger, respectively. Also, for elementary teachers, Bagley's Educative Process and Strayer's Teaching Process. Reference books: the McMurry Series for elementary teachers, and for secondary teachers, the Macmillan and the Longmans Series on the teaching of the respective subjects. As far as issued these are as follows:

1. The Macmillan Series: 1. English. Percival Chubb. 2. Mathematics. David Eugene Smith.

2. The Longmans Series: 1. English. Carpenter, Baker, and Scott. 2. Latin and Greek. Bennett and Bristol. 3. Mathematics. J. W. A. Young. 4. Physics and Chemistry. Smith and Hall. 5. History and Civics. Henry E. Bourne. 6. Biology. Lloyd and Bigelow.

B. **History of Education.** Lectures, discussions, textbooks, and prescribed readings. Professor DEGARMO. Except Sat., 9. G. S. 256. Credit, two hours.

This is a course in historical interpretation. It is based upon the development of thought and institutions, and the significance of each aspect is estimated from its bearings upon the educational problems of the present. Special emphasis is placed upon the following topics: the education of the Greek people and its bearings upon the questions of cultural and vocational education today; the rise, development, and spread of humanism in Italy, Germany, Great Britain, and the United States, with an estimate of the scope and significance of present-day humanistic training; an account of the rise and development of science and scientific method in modern education; the doctrines of educational reformers, with comparisons, as of Froebel and Montessori, Herbart and Froebel, etc.; the development of modern systems of education in Europe and the United States, with an account of the most important phases of vocational education and of the efforts of the public school to adapt itself to them. Recommended textbooks: 1. General: Monroe, Graves, Davidson, Painter. 2. Special: Davidson, *Education of the Greek People*, *Rousseau;* Quick, *Educational Reformers;* DeGarmo, *Herbart and the Herbartians;* Hughes, *Loyola;* Bowen, *Froebel;* Laurie, *John Amos Comenius;* Hoyt, *Studies in the History of Modern Education.*

C. **Educational Psychology.** Lectures, discussions, and readings. Assistant Professor WHIPPLE. Except Sat., 10. G. S. 256. University credit, two hours.

The lectures present a system of functional psychology as applied to education, with particular reference to such topics as nervous plasticity, habit, attention and interest, instinctive response, the nature of educational training and discipline, association, perception, observation, memory, imagination, conception, judgment and reasoning. Where feasible, psychological experiments that apply to the work in hand are described or performed. Students will need for class room use Whipple's Questions in General and Educational Psychology (Cornell Study Bulletins for Teachers, No. 3, C. W. Bardeen, Syracuse, N. Y.), and will find it advisable for outside reading to purchase James's Talks to Teachers on Psychology, Henry Holt and Co., and Kirkpatrick's Fundamentals of Child Study, The Macmillan Co. Students who have had no previous work in psychology are advised to take Psychology course A also. Special assistance will be given to teachers who are preparing to take the examination in psychology of the New York State Education Department.

[D. **School Hygiene.** Lectures, discussions, and readings. Assistant Professor WHIPPLE. Except Sat., 11. G. S. 256. University credit, two hours.] Not given in 1913.

E. Mental and Physical Tests of School Children. Laboratory exercises, lectures, readings, and discussions. Assistant Professor WHIPPLE and Mr. DOLL. Except Sat., 2–4.30. G. S. 248. Credit, two hours.

This work is planned to familiarize teachers and superintendents with the purposes, methods, and results of conducting mental and physical tests, and is

particularly recommended to those interested in special classes for defectives, backward, or talented children. It affords practice in the use of the recently developed scales for measuring performance in arithmetic, writing, and English composition, also in the use of the Binet-Simon diagnostic tests of intelligence, of Healy's tests for mental classification, and of numerous other scientific measurements of efficiency, e.g., tests of vision, hearing, strength, endurance, range of attention, suggestibility, inventiveness, ability to learn, to report, etc. Some acquaintance with general psychology is presupposed. The work is based on Whipple's Manual of Mental and Physical Tests.

Approximately the first half of the course will be devoted to drill work for the purpose of acquiring familiarity with the technique of mental tests and with statistical methods of handling data. In the second half of the course the chief emphasis will be laid upon the use of diagnostic tests of mental status, and here the laboratory exercises will be supplemented by special lectures upon the problem of testing and classifying feeble-minded and backward children. Competent advanced students may, however, arrange to prosecute special lines of inquiry in place of the work with diagnostic tests.

F. **Elementary Education.** Except Sat., 8. G. S. 142. Superintendent ELSON. Credit, two hours.

The course of study in action. Changing values among studies due to shifting conceptions of education; prevailing tendencies. Criteria for selecting materials in the various studies; simplifying the course by elimination of topics; standardization of requirements.

The recitation, its function and method; the assignment of the lesson; importance of right methods of study; the study lesson.

Special methods in studies, with especial emphasis on the study of English, including spelling, reading and literature, oral and written Composition; selection and sequence of topics; lesson plans; illustrative lessons.

Special problems in the various studies: The range of words in spelling; the use of literary-wholes in reading; art applied in garment-making and in the home; arithmetic applied in household accounts, etc.

G. **School Organization, Administration, Supervision, and Management.** Credit, two hours. Except Sat., 9. G. S. 142. Superintendent ELSON.

This course is intended primarily for superintendents, principals, vice-principals, supervisors, head assistants, critic teachers, executive officers, and in general for teachers holding or preparing for supervisory and executive positions.

The course will deal primarily with the newer and more complex problems of school administration, and will include the following topics:

The widening conception of the school as a social institution; the growing diversity in education and expanding activities of the school; varying community needs; varying needs of children; segregation of types; the increasing cost of education; school accounting and reporting; value of comparative tables; standardization of educational equipment and educational supplies; budget making.

The course of study; standardization of studies; time schedule; new standards of measuring efficiency; school waste; the problem of withdrawal, retardation, repetition, and non-promotion; methods of promotion; determining failures

by studies and by grades; tests of efficiency in instructing; simplifying the elementary school course; increasing opportunities for practical training.

Some attention will be given the following topics: school organization; method of appointing and promoting teachers; the merit system; service-record data; salaries; pensions; methods of promoting growth of teachers in the service.

H. **Industrial Education.** Lectures on the Problems of Industrial Education by Professors DEGARMO, KIMBALL, and others. Except Sat., 12. G. S. 142. For full statement of this course see page 15.

I. **Physical Education. Folk and National Dances, School Games.** Two sections will be formed of teachers wishing to take up either or both of these lines of work. One section will be for those without previous training, and the other for teachers with preparation for more advanced work. Credit, one or two hours. Except Sat., 4–5.30. Sage College Gymnasium, or out of doors. Miss SAMETH.

The work of this department is aimed to give a practical knowledge of some of the games and folk and national dances suitable for use in both elementary and high schools as well as in playgrounds.

Materials will be selected largely from the lists of games and dances approved by the New York Public Schools' Athletic League and those suggested by the syllabus now in use in the New York City public schools.

Gymnasium costume or dancing skirt and soft slippers (without heels) will be advisable.

Beginning class 4.00–4.40; Advanced class 4.50–5.30.

In addition to the class work indicated above, Miss Sameth will give individual advice and instruction, at hours to be arranged by appointment, on any matters of individual training or problems of teaching. She may be consulted at the office in the Sage Gymnasium 3.00–4.00 p. m. daily except Sat.

In addition to the courses described above there are in the various departments courses arranged specially for teachers. They are described under the announcement of each department. All the work of the session is arranged primarily to meet the problems of teachers and even in the elementary courses, in foreign languages, for example, selection and presentation of subject matter receive attention and illustration.

INDUSTRIAL EDUCATION

Including Courses in Manual Training, Drawing, and Handicraft

The subject of industrial education is broader than is generally assumed. It means more than the mere teaching of shop work and drawing. It suggests a scheme of education which will make it worth while for all children to remain in school, and which will provide for the children of the masses and for those who enter the great manufacturing and constructive industries something equivalent to what the state is doing for those who enter the professional and managing activities of the country.

We are all aware that many boys and girls do not have opportunity to enter employments that contribute to their development in any sense of the word,

either physically, morally, or intellectually, but drift about from one unskilled occupation to another, gaining little or nothing in efficiency.

It is believed that the right sort of handwork and drawing, combined with the proper treatment of book work, will give these children the proper training to prepare them to enter some branch of actual industrial work.

Many manual-training teachers are taking this broader view of their work and its relation to the other school work, and are endeavoring to fit themselves for the field of industrial education. Some of these teachers are weak on the technical side; others fail to grasp the pedagogical phase of the work.

The growth of industrial education is significant. The program of every institute, convention, and association of school men now gives a prominent place to the subject. State laws relating to it have been passed by New York, Massachusetts, Wisconsin, New Jersey, and Connecticut.

Legislative action in reference to industrial and agricultural education is under discussion in nearly every state in the Union. A great national movement along lines of education for efficiency is under way. Manual training, cooking, sewing, drawing, etc., are to become more than subjects within a school curriculum; they will be a part of a new system of education.

For such reasons the University offers in the Summer Session strong courses in education, handwork, and drawing.

Equipment. The shops and drawing rooms of Sibley College are among the largest and best equipped in the country. They are being used regularly by 1200 students and can accommodate 1500. They are at the disposal of the students of the Summer Session, who have the further advantage of seeing the regular instruction given to Sibley College students. They include a machine shop, a foundry, a blacksmith shop, a woodworking shop, and many drawing rooms, lecture rooms, etc. The shops are exceptionally well supplied with machines and tools for complete instruction in the various subjects.

A portion of the equipment has been rearranged and adapted for the special needs of teachers of manual training, drawing, and arts and crafts.

Teachers. The faculty of this department is made up as follows: 1. Teachers of shop work and drawing selected from the regular faculty of Sibley College. Every one of these men is a trained specialist and an experienced teacher. 2. Teachers of handicraft and drawing selected from the teaching corps of cities noted for their excellent handicraft work. 3. Professors in the University who will adapt their usual presentation of subject matter to the needs of teachers in schools of manual training and industrial education. 4. Lectures on the various subjects concerned, with a complete treatment of the problem of handwork in the public schools. Each of these men is a recognized authority in his special field.

Admission. The courses are open to men and women, and will meet the needs of: (a) teachers and supervisors of industrial arts, handwork, and drawing who wish to perfect themselves in technical skill and professional study; (b) men or women who have teaching experience, or who possess technical ability and wish to qualify as teachers of these subjects; (c) teachers in the State of New York who wish to qualify for the state examination in drawing and manual training as outlined by the State Department of Education; (d) school superintendents, principals of schools, and teachers who wish, through the lectures and conferences, to acquaint themselves with the methods and practices of industrial education.

Daily Program. The shops and drawing rooms are open daily (until noon on Saturday). The lectures for this department are given between 12 and 1 every day except Saturday. Conferences will be held during the Session onWednesday and Friday evenings. The University Library is available for reading and original work by students who desire to examine the books, pamphlets, and reports referred to in the lectures and conferences.

Courses of Study. It is believed that some knowledge of the principles of education, a definite understanding of tool processes, and the ability to express ideas adequately through the art of drawing are the professional qualifications which make for efficient teaching of subject matter coming under the head of industrial education. With this aim in view this department offers three definite courses of instruction: 1. Education; 2. Handwork; 3. Drawing.

I. Education

Problems of Industrial Education. Lectures and conferences. Except Sat., 12–1, G. S. 142. Professors DE GARMO, KIMBALL, and others.

A discussion of the development of industry and the rise of manufacturing methods, with particular reference to the effect of the same on education. Manufacturing methods have changed so radically and have influenced our educational outlook to such an extent that teachers of all branches of industrial education, and no less all supervising officers, need some knowledge of these matters if they are to attempt to prepare young people for industry. Among the topics treated will be the influence of machinery, in general, upon manufacturing methods, the economic problems of production and the co-related problems of factory legislation, factory welfare work and industrial education.

In the latter part of the course a few lectures on the practical working out of some of the problems of industrial education will be given by Messrs. Wood, Edick, and Griffith. These lectures will be illustrated by exhibits of actual school work and by lantern slides.

The Education of Girls for Vocations. Education for the "Way Out" (Continuation schools). Education for the "Way In" (Pre-vocational schools). The Training of the Vocational Teacher. Four lectures by Arthur D. Dean, Chief of Division of Vocational Schools, New York State Education Department. Mr. Dean will also conduct one or more of the evening conferences.

Evening Conferences. A series of round table conferences held each summer have proved remarkably successful in bringing together in an informal way all persons closely connected with this general field of education. The special problems of each student are taken up and discussed in the light of the combined experiences of all present. These gatherings of students, shop instructors, and lectures will be continued this year.

The following subjects are proposed for discussion: Vocational training for the age period between 14 and 16. The problem of the technical high school. The meaning of industrial education to the elementary schools. Women in industry—a problem in industrial education. The manufacturer's point of view. The workingman's point of view. The corporation school. Normal schools for training industrial teachers. The cooperative system of education. The philosophy of industrial education in the agricultural community.

II. Handwork

2. **Manual Training for the Lower Grades.** A course in handwork adapted to the first six years of the elementary school. The following processes and materials will be made use of and typical projects in each will be carried out: construction work in paper and cardboard; weaving, reed, and raphia work; basketry; block printing and stenciling; simple bookbinding; blue printing; elementary metal and wood work. This course is offered to meet particularly the needs of the regular grade teacher, and to be of help to the special teacher of art and manual training who wishes to become familiar with the problem of handwork in the elementary grades. Except Sat., 2–4. Mr. Wood.

3. **Wood Work for the Elementary Schools.** A course employing a comprehensive set of bench tools adapted to the upper grades of the grammar schools, each model considered with reference to form, fitness, and decoration. Methods of presentation and execution. This course is intended to equip a capable but inexperienced person for a position as teacher. Daily, 8–11. Mr. Edick.

4. **Wood Working for Secondary Schools.** A course which aims to prepare for the teaching of wood work in the secondary schools. It includes the study of joinery, furniture making, structural design, and decoration. Concrete problems involving the principles of the work will be suggested by the teacher and carried out by the class. The individual will have considerable latitude in the choice of the particular project and in its design and decoration. Particular attention will be paid to design. Except Sat., 2–5. Mr. Edick.

5. **Shop Lectures and Conferences.** Lectures and conferences on the organization and supervision of manual training, methods and materials, equipments, costs, and courses of study; practical talks on subjects of importance to the manual training teacher; woods and wood construction, lumber and forestry, wood finishing, etc. T Th, 4–5. Mr. Wood.

6. **Foundry Work.** The course begins with instruction in tempering the sand and making green sand moulds for small work. Following this come exercises in core making, and an explanation of loam work. Machine, floor, and sweep mouldings are briefly described. Castings are made in cast iron, and the students are taught to operate the cupola furnace. Mr. Vanderhoef.

7. **Forging for Secondary Schools.** Systematic instruction in the use of each tool as it is taken up, the study of each material worked, with an explanation of its various grades, the proper method of treatment for each, and the discussion of the methods of making large forgings. The ground covered includes instruction in the building and care of fires, heating, drawing, forming, bending and twisting, upsetting, upsetting while bending, upsetting for square corners, punching, bolt making, welding, including careful instruction in scarfing for the various welds, the making and use of heading tools, chain making, the making and fitting of braces, the construction of hooks and ring bolts, riveting, and the use of threading tools. Training is also given in the use of the power hammer. The work in steel includes drawing, forming, welding, and tempering, and spring and tool making.

This course will not be given unless a sufficient number apply to Professor Kimball on or before July 8th.

8. **Machine Work for Secondary Schools.** The different measuring tools and devices, with the advantages, methods of use, and limits of accuracy of each are

considered. Each cutting tool is taken up, its cutting angles and general adjustments are discussed, together with the feeds and cutting speeds suitable for each material worked and for each machine. The course includes instruction in centering, squaring, straight and taper turning and fitting, outside and inside screw cutting, chucking, reaming, finishing and polishing, drilling, tapping, mandrel making, grinding and lapping, boring, brass turning and finishing, ornamental turning, planing flat and V surfaces, fitting, the use of the milling machine, gear cutting, tool making, including taps, drills, reamers, milling cutters, and cylindrical gauges. Mr. WELLS and Mr. HOWE.

III. Drawing and Art Training

9. **Freehand Drawing for Elementary and Secondary Schools.** A course to meet the needs of the public school teacher. A complete course of study, in detail, from the first grade through high school is first considered. Then each subject of that course is carefully developed and worked out. This will include methods of drawing in such phases of the subject as the teacher must meet and in the common mediums such as pencil, water color, crayon and charcoal. Theory and practice will be closely correlated. The study of design and color, perspective, and the pose, for their public school value, combined with talks on methods of presenting these subjects receive thorough attention. Sketching from nature, including out-of-door work for characteristic growth of trees, forms a part of the course. The relation of art to hand work is considered and the study of design is made applicable to constructive problems. Except Sat. 9–12, University credit, two hours. Sibley 208. Mr. GRIFFITH and Miss ELY.

Although the above course forms a complete unit in itself, the following course is designed as supplementary.

9a. **Design, Fine and Applied Art.** (Open only to students who have completed course number 9 or its equivalent.) Design is considered from a more advanced standpoint and applied to color problems, book plates, title pages, constructive problems, printing and the like. Stencilling and block printing on velvets and other textiles together with the introduction of interwoven silk on these textiles will be taught; also leather tooling and coloring of leather. Advanced out-of-door sketching will supplement that started in course No. 9. Manuscript printing, done direct with quill or lettering pen together with illumination will be considered as outgrowths of the study of printing. Costume design and household decoration, as far as they are applicable to the grammar or high school, will be considered from an applied standpoint. Throughout the course illustrated lectures to develop art appreciation will be given. All subjects will be considered both from the standpoint of the secondary and the more advanced schools. A small laboratory fee (not to exceed one or two dollars) will be charged, to cover cost of material furnished. Except Sat., 8–11. Sibley 202. University credit, two hours. Mr. GRIFFITH and Miss ELY.

10. **Mechanical Drawing for Secondary Schools.** This course is designed for those who wish to teach mechanical drawing in secondary schools and for those who feel the need of a more complete knowledge of this subject to assist them in teaching shop work. Some of the topics covered are use of instruments, lettering, orthographic and isometric projection, inking, tracing, conventions, and working drawings. Students familiar with these topics may elect a more advanced course. Sibley 102. Mr. WILLIAMS.

PSYCHOLOGY

A. **Introduction to Psychology.** G. S. Room C. Credit, two hours. Except Sat., 9. Assistant Professor WELD.

This is a lecture course, supplemented by experimental demonstrations. It is intended to serve as a general introduction to the study of psychology from the experimental point of view. The following topics will be discussed: sensation, affection, attention, perception, ideation, emotion, action.

B. **The Psychology of Memory, Imagination, Learning, and Reasoning.** G. S. Room C. T Th, 11. Assistant Professor WELD. Credit, one hour.

C. **Introductory Laboratory Course.** Psychological Laboratory, Morrill Hall. M W F, 2.00–4.30. Professor WELD, Mr. RUCKMICH, and Mr. FOSTER. This course is intended to familiarize the student with the observation, under standardized conditions, of typical mental processes. Credit, two hours.

D. **The Psychological Basis of Music.** G. S. 162. T Th., 12. Mr. RUCKMICH. This course attempts to outline the aesthetic effect of the various scales, of final tones, and of the intonation of musical intervals: it reviews the facts and theories of melody, rhythm, consonance, and harmony; and it summarizes the recent literature on tests of musical ability. The lectures are not technical. They are intended for those whose interests lie in the fields of psychology and music. Credit, one hour.

E. **Advanced Work in Psychology.** Morrill Hall. Hours and credit to be arranged. Assistant Professor WELD. Essays, discussions of assigned reading, laboratory studies.

ENGLISH

A. **Composition.** Except Sat., 11. G. S. 162. Credit, two hours. Dr. BROUGHTON.

A practical drill intended for those who lack proficiency in writing: frequent short themes and several longer papers, expository, descriptive, and narrative; discussion of the elements and forms of discourse; weekly personal conferences at hours to be appointed. This course and course B (see below) will together be considered the equivalent of the first term of course 1 in the regular University session.

B. **Introductory Course in Literature.** Except Sat., 8. G. S. 160. Credit, two hours. Dr. BROUGHTON.

A study of four modern novels, and selected lyrics. This course and course A (see above) will together be considered the equivalent of the first term of course 1 in the regular University session.

C. **The History of the English Language.** Except Sat., 9. G. S. 164. Credit, two hours. Assistant Professor MONROE.

A study of the development of the language to the present day, its vocabulary, sounds, inflections, and constructions, foreign influences, and allied topics. Special attention is given to the practical bearing which the historical study of the language has upon its present form, written and spoken. Recitations and lectures; collateral reading.

D. **Nineteenth Century Prose.** Except Sat., 11. G. S. 164. Credit, two hours. Assistant Professor MONROE.

A study of representative nineteenth century prose based on careful reading and criticism of Newman and Arnold, with collateral reading of Macaulay, DeQuincey, and others. Recitations, lectures, and reports.

E. **Teachers' Course.** Except Sat., 8. G. S. 156. Credit, two hours. Dr. BAILEY.

Designed for those who are teaching English, or who expect to teach the subject. Methods of treating the novels, the poems, and the essays suggested by the College Entrance Examination Board; discussion of related topics in composition and in grammar.

F. **Shelley, Tennyson, and Browning.** Except Sat., 10. G. S. 156. Credit two hours. Dr. BAILEY.

Emphasis will be laid upon Shelley, Tennyson, and Browning as the chief poets of the nineteenth century. Wordsworth, Arnold, and Swinburne may be treated incidentally.

G. **The Study and Teaching of Literature.** Except Sat., 9. G. S. 162. Credit, two hours. Assistant Professor COOPER.

A practical course, designed for teachers of English, and in general for persons who are interested in modern languages and literatures. The first book employed will be Cook's The Higher Study of English (Houghton-Mifflin). The lectures and discussions will deal with topics like the following:

The scope and purpose of the study of literature, and its relation to the study of history and of fine art in general. The study of literary types; for example, Milton's Lycidas as a pastoral lament. The problem of teaching literature in the schools; difficulties, means, and end. Private reading and study for teachers. A nucleus of books for the library of a teacher of English. Modern literature and the ancient classics. Methods in the teaching of English prose composition.

One hour in the week (Fri., 9) will be devoted to readings by the instructor from various masterpieces, ancient and modern.

H. **The Essentials of Poetry.** Except Sat., 11. G. S. 163. Credit, two hours. Assistant Professor COOPER.

A fundamental course for teachers, and for those who wish to become special students of English. The work in the main will be carried on in the form of readings, papers, and discussions, based upon materials, in prose as well as verse, drawn from the poets themselves; as Shelley's Defense of Poetry, Sidney's Defense of Poesie, and passages from the writings of Spenser, Milton, and Wordsworth. Some account will be taken of masterpieces not only in modern, but, through the standard translations of Jebb, Lang, and others, in ancient literature as well. The books employed or recommended are adapted to the needs of students in the Summer Session. The course will be so conducted that those who wish to become more thoroughly grounded in the subject may do special reading in addition to what is required for credit.

One hour in the week (Mon., 11) will be devoted to the reading and interpretation, by the instructor, of some leading English poet.

J. **Introduction to Shakespeare.** Except Sat., 10. G. S. 164. Credit, two hours. Assistant Professor ADAMS.

A brief survey of the rise and progress of the English drama up to Shakespeare; a reading of select plays by contemporary authors; and a study of Elizabethan London and the Shakespearean playhouse. Neilson's Chief Elizabethan Dra-

matists will be used for collateral reading. The aim of the course is to give a background for an intelligent and sympathetic study of Shakespeare's plays.

K. **Shakespearean Tragedy.** Except Sat., 12. G. S. 164. Credit, two hours. Assistant Professor ADAMS.

A study of Shakespeare's dramatic art as represented in his best tragedies. The plays chosen for minute examination are Hamlet, Othello, King Lear, and Macbeth. A. C. Bradley's Shakespearean Tragedy will be used as a text book.

Graduate Work. The courses outlined above are undergraduate courses. Graduate students who wish to pursue work in English are cordially invited to correspond with any of the members of the staff who are engaged in instruction during the Summer Session. The work in question will consist of investigation carried on under the personal direction of one or more of the instructors. Graduate students are advised to obtain from the Dean of the Graduate School a copy of the Graduate School Announcement.

SPEAKING AND READING

In all the courses described below, individual instruction will be given by appointment. In this way the particular needs of each student, however varied they may be, can be met. No fees will be charged for this special instruction.

A. **Public Speaking.** Except Sat., 8. G. S. 21. Credit, two hours. Assistant Professor EVERETT.

A practical training for speaking in public. Original speeches and selections; extemporaneous speeches. Methods of preparing will be discussed and illustrated. High-school teachers will find the methods applicable to their work. Regular students passing this course will be admitted to the work of the second term in Public Speaking, course 1b.

B. **Voice Training.** Except Sat., 9.30 (half-hour periods). G. S. 21. Credit, one-hour. Mr. BLANTON.

This course consists of exercises, both physical and mental, for the development of pure tone, flexibility and strength of voice, clear enunciation, and for relief from high, strained tones, harshness, throatiness, and speakers' sorethroat. Private appointments will be given each student, in which the throat will be examined, the voice tested, and, if necessary, special exercises prescribed. The closely related subject of ease of action will also receive attention. The training is as valuable for the use of the voice in conversation as in public speaking and reading.

C. **Extemporaneous Speaking.** M W F, 10. G. S. 21. Credit, one hour. Assistant Professor EVERETT.

Discussions, based upon prepared outlines, including narration, description, exposition and argument.

D. **Oral Reading.** Except Sat., 11. G. S. 21. Credit, one hour. Mr. BLANTON.

This course is designed especially to help teachers of literature, but is open to all students. The first part of the course will be devoted to the elements of reading; attention, individualization, and sequence of ideas. The second part will be given to the oral interpretation of great pieces of literature. Each member of the class will receive a private appointment, and prepare individually at least one selection.

FRENCH

A. **First-Year French.** Grammar, reading, composition, and conversation. Except Sat., 8 and 12. G. S. 283. Professor OLMSTED. University credit, four hours. Entrance credit, one unit.

The object of this course is twofold; first, to give to beginners a thorough drill in the essentials of French pronunciation, grammar, and reading; second, to offer to teachers an opportunity to study methods of presentation of these subjects to beginners. Particular attention will be given to the subject of French pronunciation, and the conversational method of instruction will be employed as largely as possible. The entire subject of elementary French grammar will be completed, and the reading of easy texts will be begun. By supplementary reading after Summer School the beginner can prepare himself for the fall examination in Second-Year French, or he may complete the work for the second unit by taking in the University a special course three hours a week throughout the fall term.

Teachers who follow this course are recommended to take course D in connection with it.

B. **Second-Year French.** Grammar review and reading. Snow's Fundamentals of French Grammar; François' Introductory French Prose Composition; Hugo's Gavroche (Clarendon Press); Labiche's Voyage de M. Perrichon; About's La Mère de la Marquise; Dumas. père, Pages Choisies. Except Sat., 8 and 12. G. S. 281. Assistant Professor MASON. Credit, four hours. Entrance credit, one unit.

C. **Third-Year French.** Anatole France's le Livre de mon Ami (Guerlac); Quelques Contes des Romanciers Naturalistes (Dow and Skinner); Augier's le Gendre de M. Poirier; Voltaire's Zadig; François' Advanced Prose Composition. Daily, 8 and 12. G. S. 277. Professor GIROUD. Credit, five hours. Entrance credit, one unit.

This course is intended for those who have had two units of preparatory school French, or one year of college French. Students taking this course are expected to devote their entire time to the subject.

D. **Teachers' Training Course.** Lectures, discussions and sight reading. M W, 9. G. S. 283. Professor OLMSTED. Credit, one hour.

Particular attention will be given to French pronunciation, to the value of phonetic transcription and other devices for the teaching of French pronunciation.

E. **Explication de Textes.** St. John Lucas, A Book of French Verse. A course for teachers and advanced students. T F, 9. G. S. 283. Assistant Professor MASON. Credit, one hour.

Passages from representative works of the nineteenth century, both poetry and prose, will be carefully studied and criticized. The course will be conducted mainly in French.

F. **Lectures in French.** Le Roman naturaliste et la Poésie symbolique au XIX^{e} siècle. Th S, 9. G. S. 281. Professor GIROUD. Credit, one hour.

This course of twelve lectures is intended for teachers desiring to hear French spoken, as well as for all those who desire to get a rapid survey of the history of French literature.

SPANISH

A. **First-Year Spanish.** Spanish for beginners. Grammar, translation, reading, composition, and conversation. Olmsted and Gordon's Spanish Gram-

mar. Elementary readers and texts. Daily, 8 and 12, and three additional hours a week to be arranged. G. S. 290. Mr. DALE. Credit, six hours. Entrance credit, two units.

The object of this course is to afford to those who have had no Spanish an opportunity to acquire the essentials of the grammar, to learn to translate easy Spanish readily, to read Spanish as Spanish intelligently, to understand spoken Spanish, and to acquire sufficient vocabulary to be able to converse on topics of daily life. Spanish will be spoken, as far as feasible, in the class room.

There will be twelve prepared recitations a week; the three additional hours will be devoted to conversation, dictation, and written grammatical exercises.

After successfully completing this course, the students will be far enough advanced to be able to pursue the second-year Spanish course in the University.

GERMAN

A. **First-Year German.** Oral training, grammar, composition, translation. Textbooks: Vos's Essentials of German and Hewett's German Reader. This course affords an opportunity for those who have had no German to master the essentials of grammar, to acquire facility in the translation of easy German and to begin conversational work in the language. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. After successfully completing this course, students can, by supplementary reading during the summer, prepare themselves for the fall entrance examination in second-year German, or they may take the second year German course during the first term of the regular college year. Daily except Sat., 8 and 12. G. S. 183. Assistant Professor POPE. Professor Pope will be in room 182, T Th, 9 to give special assistance to members of this class. University credit, four hours. Entrance credit, one unit.

This class affords teachers of German fine opportunity for observation of methods in teaching.

B. **Second-Year German.** Rapid review of the essentials of grammar and more extensive work in translation, composition, and conversation. Two recitations will be held daily except Saturday with sufficient time between the two for the preparation of the second lesson. Textbooks: Vos's Essentials of German and Hewett's German Reader. Prerequisite: one year of high school German or its equivalent. Those who do not present certificates showing the completion of one year's work in German will be required to take a test at the beginning of the course. This course is equivalent to the second year of high school German and its completion entitles the student to a second unit of entrance credit in German. University credit, four hours. Daily except Sat., 8 and 12. G. S. 177. Dr. ZINNECKER. The instructor will be in room 178, T Th, 9, to afford special assistance to members of this course.

C. **Third-Year German.** Reading and translation of German texts accompanied by exercises in grammar, composition, and conversation. Two recitations a day will be held, with a sufficient interval to enable the student to prepare for the second recitation. Text-books: Joynes-Wesselhoeft's German Lesson Grammar, Wildenbruch's Der Letzte, Storm's In St. Jürgen, Freytag's Die Journalisten. Prerequisite: two years of high school German or its equivalent. The completion of this course entitles the student to the third unit of entrance

credit in German. Daily, 8 and 12. G. S. 134. Dr. ANDREWS. University credit, five hours.

The instructor may be consulted T Th, 9 in room 178.

D. **Advanced Course in Modern German Grammar.** Except Sat., 12. G. S. 137. Assistant Professor BOESCHE. Credit, two hours.

The aim of this course is entirely practical. It is particularly intended to serve the needs of teachers of German who feel that without a thorough and fairly scientific knowledge of grammar there can be no competent teaching of its elements. The most troublesome and important questions in modern German accidence and syntax will be discussed with greater thoroughness than is found in even the larger general works on the subject. The inflection of pronouns and adjectives, the use of the cases, the employment of haben and sein as auxiliaries, the subjunctive, moods and tenses in indirect discourse, and the order of words will be among the topics treated.

E. **Advanced Composition and Conversation.** Except Sat., 8. G. S. 190. Assistant Professor DAVIDSEN. Credit, two hours. This course will aim to train the students to write and to speak correct German. It will be conducted as far as possible in German. Papers, based upon pictures and works of literature discussed orally in class, will be handed in regularly and corrected by the teacher. Certain hours will be set aside for instruction in elementary phonetics, if the class so desires.

F. **Studies in the Style and Technique of the Nineteenth Century Prose Writers.** Except Sat., 10. G. S. 190. Assistant Professor DAVIDSEN. Credit, two hours; with one hour more for extra work assigned.

Selected 'Novellen' of Goethe, Grillparzer, Hoffmann, Hauff, Keller, Storm, Heyse, C. F. Meyer, and Liliencron will be studied with reference to their style and technique. Among the topics discussed will be: *Rahmenerzählungen; Erinnerungs=, Bekenntnis = und Chroniknovellen; Ich-Erzaählungen; indirekte Erzählungen.*

The work will be mostly conducted in German. Extensive reading will be required, mostly of ordinary difficulty and largely of works read in schools and colleges.

G. **Lessing's Life, Writings, and Influence.** Except Sat., 11. G. S. 137. Assistant Professor BOESCHE. Credit, two hours. This course will deal chiefly with Lessing, the revolutionizing critic and "liberator." His poetical works will be studied mainly as exemplifying and expressing the principles of the thinker. The general subject of the German literary revolution in the 18th century will be treated, with special attention to the influence of English literature. Lectures, in German only, will alternate with discussions, in which the use of German will be encouraged, but not required. There will be no translation into English. Those without sufficient previous practice in listening to spoken German will be aided by specified references to English and German works. A fair degree of fluency in reading German will be presumed. Any edition of Lessing's works may be used. A good low priced edition will be obtainable in Ithaca.

This course alternates with a similar course on Goethe.

H. **Training Course for Teachers.** Except Sat., 9. G. S. 190. Dr. MONTESER. Credit, two hours, with an extra hour for work assigned.

The aim of this course is to aid the teacher of modern foreign languages in the practical solution of class room problems by a study and demonstration of methods used by progressive teachers in Europe and in this country.

Among the topics to be treated are the following: a brief history of the teaching of German in the United States; the Report of the Committee of Twelve; the reform movement in the teaching of foreign languages in Germany and other European countries; the educational value of German; the aim of the teaching of German in a two years', three years', and four years' course in the high school; the question of introducing German into our elementary schools; the bearing of certain results of modern psychology on the instruction in modern languages; the place of phonetics; standard pronunciation; the inductive method of teaching grammar; the treatment of special topics in grammar and syntax; drill and habit-formation; "living" grammar; the Gouin method; use of connected texts and of detached sentences in elementary language work; the relation of oral work to written exercises; the building up of a vocabulary; the amount and proper selection of reading matter for the different years of the course; the place of translation in connection with reading; reading without translation; dramatization of stories; the treatment of poems; the historical and geographical background of the reading matter, leading to a sympathetic understanding of the life of the German people; the use of pictures and other illustrative materials; formal prose composition and free composition; the use of German journals and magazines; helpful adjuncts to class room work, such as the use of a pupils' library, a German "Verein," and international pupils' correspondence; the preparation of the teacher and aids to self-improvement.

The New York State Syllabus of 1910, the requirements of the College Entrance Examination Board, and the present syllabi for the teaching of modern foreign languages in the elementary and high schools of the city of New York will also be studied.

In order to help the teacher in the selection of text books to be used with beginners, an exhibit of the most recent grammars and elementary readers will be made, and a number of these will be critically studied by the students.

I. Model and Observation Class. Except Sat., 10. In connection with the course, a small number of children between the ages of twelve and fourteen years who have never studied German, will be taught by the instructor in the presence of the students. These lessons will form the basis of criticism and discussion. In addition, model lessons on more advanced topics will be worked out by the instructor and by various members of the class, and these lessons will likewise be criticized and discussed by the students.

J. **Six Lectures in German** on popular subjects, and open to the general public, will be given on Wednesday evenings by Dr. BOESCHE and Dr. DAVIDSEN in a room to be assigned later. The following topics will be discussed: The German Constitution, German Churches of the Middle Ages, German Painters of the Nineteenth Century.

In order to give additional practice in speaking and hearing German, provision will be made in the Sage College dining room for a table at which German only will be spoken. Teachers wishing to engage places at this table are requested to write Professor Pope.

LATIN

The Summer Session work in Latin is intended primarily for teachers in secondary schools. The courses offered aim to secure this end in two ways:

first, course (A) is planned with the purpose of giving intensive consideration to the fundamental problems involved in the daily work of the secondary teacher; second, by means of an advanced reading course (B) the attempt is made to increase the range of the teacher's familiarity with the literature and to open up new topics of interest connected with Roman life and thought.

A. **The Teaching of Latin in Secondary Schools.** Except Sat., 9. G. S. 134. Professor BENNETT. Credit, two hours. This course will give consideration to the main topics of vital importance to the teacher in his daily work. Thus, attention will be given to pronunciation, to the reading of Latin verse, to the syntax of the Latin cases and moods, particularly of the subjunctive, to the method of teaching Latin composition, to the best method of acquiring a vocabulary, to reading at sight, to the range of reading desirable for secondary pupils, to collateral study suitable for the school. Sample recitations in beginning Latin, Caesar, Cicero, and Virgil will also be conducted by the professor in charge of the course. Those intending to take course A should bring texts of Caesar, Cicero, and Virgil.

B. **Reading Course in Latin Poetry.** Except Sat., 10. G. S. 134. Professor BENNETT. Credit, two hours. In this course the class will read selections representing the best of Latin poetry from Lucretius and Catullus down to the later empire. The book used for this purpose can be purchased in Ithaca. Work will also be assigned in the study of the literary history and significance of the authors from whose works the selections are chosen. Each member of the class should bring Mackail, History of Latin Literature, or Duff, A Literary History of Rome. This course will be supplemented by a weekly lecture on selected topics in Roman life and art. These lectures will be illustrated by the lantern and will cover the topics: Roman marriage and status of women; Roman education; the Roman house; the reliefs of the Titus and Constantine arches; the Ara Pacis; Trajan's Forum and the Beneventan arch.

HISTORY AND GOVERNMENT

A. **American History. The Period of Civil War and Reconstruction, 1850–1875.** Except Sat., 9. G. S. 234. Credit, two hours. Professor BRETZ.

A general course covering the more important issues in the period indicated. The best historical literature for the period will be pointed out and the results of the more recent study of the field will be indicated. The work of the course will consist chiefly of lectures with assigned reading.

B. **American Government and Politics.** Except Sat., 8. G. S. 234. Credit, two hours. Professor BRETZ.

A survey of American constitutional development with reference to the more important questions of politics and government at the present time. Among the topics treated are: judicial control and the proposed recall of judicial decisions; amendments to the Federal Constitution, with special reference to the interpretation of the Fourteenth and Fifteenth Amendments; and constitutional questions arising from the acquisition of territory in the Spanish-American War. Attention will be paid to other problems of current politics.

C. **English History to 1485.** Except Sat., 11. G. S. 242. Credit, two hours. Professor LUNT.

A survey of the salient aspects of political, constitutional, economic and social development. The lectures deal with the land and the people; the development of a Teutonic civilization; the changes wrought in the social and legal framework by the imposition of feudalism; the foundation of the English constitution; the gradual rise of representative institutions; the relations with the continent; the introduction and spread of Christianity; the growing power of the Church and the conflict between Church and State; life in town and country; the growth of commerce and industry and the rise of the middle class; intellectual currents and the birth of modern England.

D. **Recent European History.** Except Sat., 10. G. S. 242. Credit, two hours. Professor LUNT.

An introductory survey of the history of England and the principal continental countries since about 1870, followed by more extended treatment of contemporary politics and institutions. Emphasis is placed on internal affairs, and recent constitutional, economic, and social developments are given an historical perspective. Consideration is given to the working of parliamentary institutions in England, France, and Italy and the reasons for success or failure in each country; the growth of socialist parties; old age pensions and employers' liability acts; proportional representation in France; the reform of the English House of Lords; and other similar topics.

ECONOMICS

A. **Principles of Economics.** Except Sat., 11. G. S. 264. Credit, two hours. Professor KEMMERER.

In this course a survey will be made of the more fundamental principles of economic science. These will be studied with particular reference to their application to current economic and social problems in the United States. The aim of the course is not only to give principles and facts, but also to train the student in the exercise of an unbiased judgment on present-day economic problems.

C. **Corporation Finance.** Except Sat., 8. G. S. 264. Credit, two hours. Assistant Professor BAUER.

The nature, organization, and legal standing of corporations; stocks and bonds, their nature and classification, the basis of their issue, and the factors determining their value; corporation balance sheets, income statements, and other financial reports; consolidations, reorganizations, and receiverships.

D. **Money and Banking.** Except Sat., 10. G. S. 264. Credit, two hours. Open only to students who have had or are taking course A or its equivalent. Professor KEMMERER.

This course will consider the general principles of money and banking, their exemplification in American history, and their application to certain problems at present agitating the public mind, such as the increased cost of living, and the reform of our national banking system.

E. **Accounting.** Except Sat., 9. G. S. 264. Credit, two hours. Assistant Professor BAUER.

(a) The principles of double entry bookkeeping, including the theory of debits and credits, the analysis of the different classes of accounts, and the closing up of the ledger. (b) A discussion of balance sheets, income statements, the accountancy of stocks and bonds, cost-keeping, etc.

A special announcement of the Department of Music is published giving full details of all the Summer Session courses in the subject. This will be sent post-free on application to the Director of the Summer Session.

COURSES OF INSTRUCTION IN THE DEPARTMENT OF MUSIC

Most of the courses offered consist of five exercises a week, one each week day except Saturday. The number of actual hours of class work in any course may be found by multiplying the weekly exercises by six.

The word "hour" used in speaking of University credit, means the equivalent of one class exercise a week for a half year. One hundred and twenty such hours constitute the "hours" requirement for the degree of Bachelor of Arts.

Courses for Supervisors of Music

These courses are primarily intended for the training of supervisors and special teachers of music in the public schools. The time required for the completion of the work depends on the ability and capacity of the student and upon the amount and quality of training which the student has had previous to entrance.

Students who are proficient in sight reading, ear training, piano playing, and singing, and who pass the examinations for the preparatory and first-year courses, may thus complete the work in two Summer Sessions. Others will find it necessary to attend three or four Summer Sessions with a considerable amount of study at home during the academic years between Sessions. Full and detailed information in regard to this home study may be had on application to Professor Hollis Dann.

High and Normal School Music Teachers

The demand for high school teachers who are qualified to teach music in addition to other subjects is increasing rapidly, especially in the State of New York where the courses in dictation and melody writing and in chorus singing and the rudiments of music are being generally offered by the high schools throughout the State. The regulations governing the New York State normal schools now declare that the preparatory course in vocal music in secondary schools must provide adequate instruction in sight singing, rudiments of music, etc., for 152 periods. It becomes almost a necessity, therefore, that every high school faculty shall include a teacher capable of giving instruction in music. Teachers of other high school subjects, who are musically inclined, can easily prepare at the Summer Session of Cornell University to teach high school music as required by the State thus solving the problem confronting the secondary schools which offer a normal preparatory course.

The courses in sight reading, rudiments of music, chorus singing, dictation, and melody writing are especially adapted to the training of teachers experienced in high school work other than music. The five Regents' counts for vocal music may be obtained by the students of secondary schools employing such a teacher.

Teachers who are capable of taking charge of music in normal schools are needed in every state. Careful attention is given to the training of teachers to fill these positions. Special classes in the study of high and normal school problems in music are included in the courses offered.

Courses for Grade Teachers

The probability is that the near future will witness a requirement made by school boards and state boards of education, demanding that the grade teacher shall qualify in music as she must qualify in every other subject in the elementary curriculum. Such a requirement is already in force in several states. This makes a special course of music for grade teachers an actual necessity.

In offering work for grade teachers, Cornell University is the first to place at the grade teachers' disposal, a practical opportunity for thorough preparation in the subject of public school music. A teacher who takes the preparatory-year and first-year courses and completes the work satisfactorily, will have received thorough training in sight reading, in ear training and dictation, will have taken an elementary course in melody, and will have received instruction in the methods of presenting public school music. Changed conditions and the important place music has assumed in public education, make training to this extent a requisite. It gives the teacher as much freedom in knowledge of methods and materials in music as in the subjects of geography, spelling, arithmetic, and the like.

Preparatory-year courses are designated A. First-year courses are designated B. Second-year courses are designated C. Third-year courses are designated D.

Sight Reading—A. This is an elementary course. All that is required for entrance is sufficient aptitude and ability to pursue the subject with profit. The requirements for the completion of the preparatory-year sight reading include the ability to read at sight simple music, such as is taught in the first three grades in the public schools, using the Latin syllables.

Daily except Wednesday and Saturday, 2.15, Barnes Hall, Miss WHITE.

Sight Reading—B. This course requires the reading at sight of music taught in the first six grades of the public schools.

Monday, Tuesday, and Thursday, 2.15, Barnes Hall, Mr. ABBOTT.

Sight Reading—C. The student is required to read at sight without accompaniment, the music used in the upper grades of the public schools including music used in the high school, reading words and music simultaneously.

Wednesday and Thursday, 8.55, Barnes Hall, Mr. ABBOTT.

Dictation—A. (Study of tone and rhythm). The only requirement for entrance is a general aptitude and capacity for the study of music including the ability to match tones.

The subject matter of music is presented first to the sense of hearing. In this course the student gains the power to think tones and to sense rhythms, and at the same time acquires a practical knowledge of the scale and the Latin syllables used in sight reading.

Daily except Saturday, 8.55, Barnes Hall, Miss WHITE.

Dictation—B. This course deals with the problems of tone and rhythm included in the first five years in the public schools.

The topics for consideration are oral and written tonal dictation, and oral and written metric dictation. Through the daily oral and written lessons the student gains the power to hear what he sees and to write what he hears.

University credit, two hours.

Daily except Saturday 8:55, Barnes Hall, Mr. BUTTERFIELD.

Dictation—C. (Study of tone and rhythm). This course includes the sixth, seventh, and eighth years of tone and rhythm study in the public schools. The student is required to recognize and write any melody of moderate difficulty in both major and minor keys. Additional training, including the recognition and writing of music in two, three, and four parts, is also required as a part of the necessary equipment of the supervisor.

University credit, two hours.

Daily except Saturday, 8.00, Barnes Hall, Mr. BUTTERFIELD.

These courses in musical dictation together with the courses in sight singing and melody, give to the student a mastery of the elementary subject of music, and constitute the foundational training essential for advanced study.

The marked superiority of the best European schools of music over American schools is largely due to the thorough and efficient three-year course in sight reading and dictation which is required of every student. The results are everywhere apparent. The student in harmony and counterpoint hears and visualizes the chord and the melody before he writes them; the orchestral player hears the tones and feels the rhythm of a difficult passage before he plays it; the singer likewise possesses the musicianship which comes with the ability to read and write the language.

For both teacher and pupil, the power to hear what is seen and to write what is heard, is absolutely essential to real success.

In music, as in other languages, the ability to read and write with facility is a prerequisite to advanced study.

The proper place for this foundational training is in the public elementary and secondary schools; the medium for its attainment is the supervisor of music.

Material—A. This is an elementary course. The work consists of the practical use and application of the subject matter studied in Ear Training A, Rudiments of Music A, and Sight Reading A. The course includes the study of elementary tonal and rhythmic principles together with simple, concise methods of teaching and applying the same.

Daily except Saturday, 8.00, Barnes Hall, Mr. ABBOTT.

Material—B. This course is devoted to the material for the kindergarten and for the first four years in music. It also includes the presentation of the material and methods of teaching rote songs.

University credit, one hour.

Daily except Friday and Saturday, 10.45, Barnes Hall, Miss BRYANT.

Material—C. This course is devoted to the material for the fifth, sixth, seventh, and eighth grammar grades. The sequence of idiomatic development of the subject and the interrelation of songs and studies are emphasized. Sight reading of words and music simultaneously supplements the singing with the syllable names.

University credit, one hour.

Daily except Friday and Saturday, 10.45, Barnes Hall, Mr. ABBOTT.

The three courses in Material are given by expert supervisors. The methods employed are those used in the school room. These courses therefore become a laboratory demonstration of the material and methods used in teaching music in the public schools from the kindergarten to the high school. On Friday of each week the work is illustrated with classes of children from the Ithaca public

schools. Students thereby have the opportunity of seeing the material and methods for each grade exemplified in the most practical way.

Methods—C. This course is devoted to the pedagogical consideration of music from the kindergarten to the fifth year inclusive. The work of each year is taken up in detail and all problems which confront the grade teacher and supervisor are thoroughly discussed. Plans and methods for class-room work and general supervision are carefully presented.

On Friday of each week, the lesson will consist of a demonstration of the year's work under consideration, by a class of children from the Ithaca public schools. Students in this course will thus have the opportunity of observing the practical application of methods with classes of children, from the kindergarten to the fifth year inclusive.

University credit, two hours.

Daily except Saturday, 9.50, Barnes Hall, Professor DANN.

Methods—D. This course is open only to students who have completed Methods C, and is concerned with the pedagogical consideration of music in the grammar grades. The course will deal with the details of teaching and of supervision in the upper grades.

Instruction is given in this course for the proper training and direction of the grade teacher. All the problems which confront the supervisor are thoroughly considered, and a systematic plan is laid out for his guidance.

Practical application of the instruction given will be made in the form of practice teaching by each member of the class with classes of children from the Ithaca grammar schools.

University credit, two hours.

Daily except Wednesday and Saturday, 2.15, Barnes Hall, Professor DANN.

Rudiments of Music—A. This course provides instruction in the elements of music. The following are taken up for study: clefs, signification and origin; names of pitches as established by the G-clef and F-clef; construction of major scale (without key-signature), note-values, and rhythm (different rhythms with the same meter), normal, harmonic, and melodic minor scales (without key-signatures); key-signatures; notation of chromatic scale with each key-signature; intervals; definitions of terms most frequently used in music.

Daily except Friday and Saturday, 9.50, Barnes Hall, Mr. ABBOTT.

Melody—B. Original oral melodies with their visualization; intervals; melody writing in major, diatonic, and with simple skips.

University credit, two hours.

Daily except Saturday, 8.00, Barnes Hall, Mr. SWIFT.

Melody—C. Melody writing in minor; triads; melody writing with special reference to triad suggestion; triad connection at keyboard; transposition; dominant seventh-chords.

University credit, one hour.

Monday and Tuesday, 2.15, Barnes Hall, Mr. SWIFT.

Melody and Harmony—D. Melody writing for two voices; connection of triads in four-voice writing in major and minor; resolution of the dominant seventh; modulations; inversions of triads and seventh-chords; harmonic analysis of compositions.

University credit, two hours.

Daily except Saturday, 9.50, Barnes Hall, Mr. SWIFT.

High and Normal School Music—Conducting

This is an advanced course to which only third-year and still more advanced students are admitted. Courses in theory, in musical appreciation, and in chorus singing are outlined and presented in detail. The many difficult problems which confront the music teacher in the high and normal school, are carefully studied.

Some of the topics for special consideration are: the school chorus, glee clubs and orchestra, classification of voices, grading and classification of high school students in music, bibliography of choral and orchestral music suitable for high and normal school, preparation for normal and training schools, elective courses, credits for music, and means for cultivating the musical taste and ideals of the school and community.

A prominent feature of the work of this class is a practical course in conducting. Each student will be required to prepare and conduct choral selections under the supervision of the instructor. The work will also include instruction and practice in the reading of full scores for chorus and orchestra.

University credit, two hours.

Daily except Saturday, 8.00, Professor DANN.

Practice Teaching

Practical use of the material for all grades, and application of methods of teaching, are required.

Each student will be given frequent opportunity for practice teaching under supervision of different members of the Faculty. Classes of children from the different grades of the Ithaca public schools will be in attendance.

No student can complete the course for supervisors until he is able to demonstrate his mastery of the subject matter and methods by actual teaching. **It is highly important that each student shall have had some experience in teaching in the public schools before entering this class.** At least a year's experience as a grade teacher is invaluable and almost indispensable.

University credit, one hour.

Daily except Friday and Saturday, 8.55, Barnes Hall, Miss BRYANT.

Chorus

Required of all students in music.

Five periods a week are devoted to chorus singing and to instruction in the technical and interpretative elements of choral music.

Topics for special consideration are: position, breathing and breath support, the study of vowels and consonants as applied to singing, and the preparation and performance of choral music by classes.

Cantatas and choruses suitable for high and normal school will be studied and performed by the chorus at the public recitals given by the Department of Music during the Summer Session.

Daily except Saturday, 11.40, Sage Chapel, Professor DANN.

Lectures

Required of all students taking the course for supervisors.

Course One. Twelve lectures on the correlation of music with literature and

the arts as a means of cultural attainment. The titles of the lectures are as follows:

1. Introduction. 2. Mental and Physical Efficiency. 3. The Technique of Study. 4. The Study of Environment. 5. What are Utilitarian Activities? 6. Principal and Collateral Activities. 7. Methods: Their Purpose and Danger. 8. Music as a Community Asset. 9. The Mastery of a Book. 10. The Attainment of Culture. 11. The Relation Between Art and Business. 12. Recapitulation of the Course.

Monday and Tuesday, 3.00, Sage Chapel, Mr. TAPPER.

Course Two. A course of lectures on vocal art and technique. The course will include the following topics:

Breathing, correct standing, body development; voice placing, what is meant by high and forward placing, breath support; tone emission, vocal balance or poise, resonance, tone color, articulation; vocal faults, singing out of tune, tremolo, hollow and metallic sounds, tongue and jaw interference; legato singing, canto, phrasing and diction, technique; resumé, repertoire.

Thursday and Friday, 3.00, Sage Chapel, Mr. HAYES.

Certificates

A certificate for work accomplished is granted to all those who pass successfully the required examinations at the close of the session.

A grade teacher's certificate is granted to those who complete the preparatory-year and first-year courses and pass satisfactory examinations.

A supervisor's certificate is granted to those who complete the course and satisfactorily pass the examinations.

MATHEMATICS

Courses A, B, and C are planned for those teachers in secondary schools who wish to review these subjects. They are equivalent to the advanced entrance requirements of Cornell University and of the College Entrance Examination Board. They presuppose a ready knowledge of elementary algebra (through quadratic equations), and of plane geometry.

Credit, A, B, and C, three hours each.

A. **Advanced Algebra.** Except Sat., 9. White 9. Dr. HURWITZ. Except Sat., 10. White 1. Assistant Professor GILLESPIE.

B. **Solid Geometry.** Except Sat., 10. White 2. Dr. OWENS.

C. **Trigonometry.** Except Sat., 8. White 6. Dr. CRAIG. Except Sat., 11. White 25. Dr. MCKELVEY.

Courses D, E, and F are equivalent, respectively, to (a), (b), and (c) of course 5 in Mathematics, regularly given during the academic year. Course D presupposes A, B, and C; E presupposes D; and F presupposes a thorough knowledge of formal differentiation; the equivalent of at least Chap. II of Snyder and Hutchinson's Elementary Textbook on the Calculus. The work will consist in large part of recitations from textbooks. University credit, D, four hours; E, three hours; F, four hours.

D. **Analytic Geometry.** Eight recitations each week. Daily, 9 and T Th, 11. White 1. Assistant Professor GILLESPIE.

E. **Differential Calculus.** Daily, 9. White 25. Dr. McKELVEY. Daily, 10. White 6. Dr. CRAIG.

F. **Integral Calculus.** Eight recitations each week. Daily, 8 and T Th, 11. White 24. Professor SNYDER. Daily, 8 and T Th, 11. White 2. Dr. OWENS. Daily, 8 and M W, 11. White 9. Dr. HURWITZ. Daily, 9 and M W, 11. White 27. Assistant Professor SHARPE.

G. **Projective Geometry.** Daily except Sat., 9. White 24. Credit, three hours. Professor SNYDER.

In this course the principles underlying projective forms and constructions of the first and second degrees will be carefully developed. Particular attention will be paid to the application of these principles to elementary geometry, so as to make the work helpful to teachers of this subject. No knowledge of mathematics beyond plane geometry will be presupposed.

H. **Differential Equations.** Daily except Sat., 10. White 27. Credit, three hours. Assistant Professor SHARPE.

The principal aim of the course is to develop methods of solution of ordinary differential equations, and to explain their application to physics and to geometry.

J. **Teachers' Course in High School Mathematics.** Mr. WILLIAM BETZ.

This course is intended exclusively for actual or prospective teachers in secondary schools. It presupposes a good working knowledge of the mathematical subjects usually included in a high school curriculum. The course consists of two parts, and the taking of both is strongly advised, although part 1 may be taken alone. The course will represent the point of view of the school rather than of the college.

1. Lectures and Discussions. This part will include a brief discussion of the present movement in secondary education; a rapid historical survey of the development of elementary mathematics; a study of the aims of mathematical teaching; a topical outline of secondary mathematics; a detailed consideration of certain critical chapters; an analysis of the best methods, with applications; an account of the international reform movement and its effects. The bibliography of secondary mathematics will receive careful attention throughout. Except Sat., 11, White 10. Credit, two hours.

2. Conferences. This part is intended to be of a thoroughly practical character, supplementing and illustrating the lectures. Samples of work done by pupils, outlines, references, "model lessons", and individual instruction, will be some of the means adopted to meet the needs of individual teachers. Except Sat., White 10. Credit, two hours.

Teachers are advised to bring with them any of the following: The Teaching of Mathematics in the Secondary School, J. W. A. Young, (Longmans); The Teaching of Geometry. The Teaching of Arithmetic, David Eugene Smith (Ginn & Co.); Fundamental Concepts of Algebra and Geometry, J. W. A. Young, (MacMillan).

PHYSICS

All courses are given in Rockefeller Hall. Courses 7a and 7b are not given during the regular year, and University students may not receive credit for them. All other courses are given under the same numbers as during the regular

academic year. Regular University students may enter these latter courses under the same conditions as prescribed in the course of instruction and credit will be allowed as indicated below.

All courses are open to teachers who can take them with profit. Those who have not had college physics are advised to take courses 1 and 5, 10, and 7 if time permits. Those who have had college physics may take courses 6, 8 or 9, and 14, and the lectures in course 1 may be attended even if not taken for credit. Teachers are entirely at liberty to take portions of courses when such an arrangement is to their advantage. Every effort will be made to adapt the work to the needs of students and to give opportunity to profit from the exceptional equipment of the laboratory.

1. **Lectures with Experiments.** This course is intended to furnish the basis found desirable for systematic courses in textbook and laboratory. Much attention has been given to the development of demonstration apparatus for this course and even those fairly familiar with the subject may find it to their advantage to attend. The subjects for 1913 will be mechanics, heat, electricity, and magnetism. Except Sat., 12. L. R. B. Credit, two hours. Professor SHEARER.

5. **Recitations on Lecture Course 1.** M W F, 8. Room 105. Professor SHEARER and Assistant Professor GIBBS. University credit, one hour.

This course combines supervision of note books in course 1, problems and discussions of topics treated in the lectures.

6. **Recitation Course.** This course is open only to those who have completed course 1, or its equivalent. For the students in the Summer Session courses 8 and 9 (without course 14) are the equivalent of course 6. Credit, two or four hours.

7. **Teachers' Course.** Especially designed to meet the needs of teachers of physics in secondary schools. The course consists of two parts (either of which may be taken alone, although it is advisable to take them together) and is intended to present the subject from the point of view of the school instead of the college. As it is given in the afternoon, it may be taken in addition to many of the regular forenoon courses.

7a. **The Adaptation of Demonstration Work to High School Teaching.** Among the topics treated will be the selection of apparatus, the operation and use of the projection lantern, experiments in various branches of physics suitable for demonstration courses, simple apparatus, and the adaptation of common things to educational purposes. T Th, 2–5. Assistant Professor GIBBS.

7b. **The Purpose and Administration of Laboratory Teaching in High Schools.** The spirit of modern laboratory teaching; suitable laboratory problems and the equipment adapted to the successful solution of them by pupils of high school age. Books and apparatus for this work will be provided in addition to the unexcelled equipment of the University laboratory. This course will be given in the afternoon, in order not to conflict with other courses in physics. Laboratory 10. M W F, 2–5, and forenoons by appointment. Professor HALE.

8. **Recitations in General Physics.** Theory and problems. This course includes work in mechanics, properties of matter, magnetism and static electricity. It is to be accompanied by experiments in laboratory course 14. The course is intended to follow a first college course in general physics including lectures,

demonstrations and discussions. Course 8 is required of the engineering students of Sibley College in the first term of the sophomore year.

Credit, two hours. Prerequisite, either physics 1 and 5 or 1 and 10, and mathematics 5 or their equivalents. Except Sat., 8. Room 105. Assistant Professor GIBBS.

9. **Recitations in General Physics.** Theory and problems, continuation of Course 8. Subjects treated include current electricity, quality, capacity, induced electromotive force. Required of engineering students in Sibley College during second term of sophomore year. Except Sat., 12. Room 105. Assistant Professor RICHTMYER.

10. **Physical Laboratory.** This course is one primarily designed for teachers of elementary physics and for those students who have had or are taking a lecture course covering thoroughly elementary physical principles in the various branches. In general, the simpler forms of apparatus are used but of such a grade as to adapt them to the needs of careful investigators. The apparatus available affords study in units and their relations, statics, kinetics, molecular physics, light, sound, electricity, and magnetism. The work may at the beginning of the term be arranged for each individual, covering as many or as few of the general divisions of the subject as seems desirable. The work may be varied to meet the needs of the students as the work progresses, since in all cases individual instruction is given. Each student will thus have the opportunity to devote his energies to his chosen part of the subject. Occasional discussions of general interest may be held covering such subjects, as methods of making observations and of using them to the best advantage, accuracy of results, computations, errors, the interpretation of data by means of curves, the theory of particular experiments, and other topics as they may occur.

University students having the requisite requirements for admission to course 10 in physics as given in the Courses of Instruction for the year 1913–14 may elect this course, following the schedule prescribed for regular work during the academic year.

One to five three-hour periods a week. Except Sat., 9–12. Assistant Professors BLAKER and RICHTMYER. Credit, one to three hours.

14. **Physical Experiments.** Theory and method of physical measurements. The course presupposes a thorough course in elementary physics, both in theory and in the laboratory. It consists of setting up and adjusting apparatus and of performing fundamental experiments; a study of approximations, errors, and methods of computation; and interpretation of results, both analytically and graphically.

The apparatus available renders it possible to make accurate measurements in the different branches of general physics. A few of the subdivisions that may be covered are in friction, work, power, efficiency, uniformly accelerated linear and angular motions, moments of inertia, coefficients of expansion of solids, liquids, and gases, vapor tension and vapor density, the usual determinations in heat; the study of thermometers, their calibration and comparison, a thorough study of the analytical balance, including a determination of its errors and limitations. In sound, studies may be made in resonance and interference. The work in light comprises a study of lenses, the grating, the adjustment, and the use of the spectrometer, and photometry of various light sources. The equipment in elec-

trical and magnetic apparatus is such as to afford special facilities for the determination of electrical and magnetic constants and for work in electrical measurements such as the measurement of current, electromotive force, resistance, self and mutual induction, capacity, study of the magnetic properties of iron, and the use of standard instruments of a theoretical and a practical nature.

The work being individual, it may be planned to meet the requirements of the student and may cover as many or as few topics as seem desirable. Reports on the work done covering theory and results are to be submitted for criticism. Credit from one to four hours. Prerequisite courses 1 and 6 or 1 and two hours of 10.

One to five three-hour periods a week. Except Sat., 9–12. Assistant Professors BLAKER and RICHTMYER.

25. **Advanced Laboratory Practice.** A course in general physics, open to those students who have had course 14 or its equivalent and who desire to take up special subjects for detailed study, putting much more time on individual problems than is advisable in course 14. It is intended for those students who desire at some time to do advanced laboratory work in research, and for teachers in laboratory physics in colleges. Such problems in research as can be completed in the time available may be undertaken by special arrangement. Apparatus of high quality is available for this work.

Credit varies with the amount of work done. The laboratory will be open daily from 9 to 12 excepting Saturday. Assistant Professor BLAKER and Professor SHEARER.

CHEMISTRY

All courses are given in Morse Hall. L. R. = Lecture Room.

The courses announced below correspond as follows to regular University courses: A to course 1; B to part of 48; C and E to 6; C and D to 7; E (with part of F) to 12; F to 14; G to 17; H to 19; I to 20; J and L to 30; K and M to 31; N to 37; R to 65; S to 66; T to 70; U to 71; V to 75; W to 76.

The recitation and laboratory work will be arranged, within reasonable limits, to meet the individual requirements of teachers registered in the respective courses. For students wishing to obtain University credit, the requirements for admission to the courses will be the same as during the regular University sessions. For teachers not intending to have their work apply toward a Cornell degree, these requirements will not be rigidly enforced.

A. **Introductory Inorganic Chemistry.** a. Lectures except Sat., 12. L. R. 1. Professor BROWNE and Mr. DAVIS. The lectures deal with the fundamental theories and laws of chemistry and with the more common elements and their compounds. They are profusely illustrated by experiments. The course is primarily designed to meet the needs of teachers in secondary schools, and to that end emphasis is laid upon methods of lecture presentation and experimental demonstration. Students other than teachers must, before registering, satisfy the Department that they are properly prepared to carry on the work.

b. Laboratory work, M W, 8–12, and T Th F, 9–12. Dr. WELSH and Mr. FINK. A series of experiments designed to illustrate the fundamental laws of chemistry and to acquaint the student with the properties of the principal elements and their compounds. For the benefit of teachers who may take the course

especial attention will be given to methods of laboratory instruction, qualitative experiments, and the blowing of simple glass apparatus.

c. Recitations. T Th F, 8, Recitation Room B. Dr. WELSH. The recitations deal with the subject matter of the lectures and with the experimental work in the laboratory; thorough drill in the solution of chemical problems. Credit, six hours.

B. **Selected Topics in Advanced Inorganic Chemistry.** Lectures, M W F, 10, L. R. 2. Credit, one hour. Dr. WELSH. Experimental lectures dealing with various topics in the field of general and inorganic chemistry, and covering some of the more important recent advances.

C. **Qualitative Analysis.** Lectures, M W F, 11, L. R. 4. Dr. LEMON. Laboratory, except Sat., 1.30–4.30, Dr. LEMON and Mr. ULRICH. An elementary course for those who have had the equivalent of course A. A study in laboratory and class room of the methods for detecting and separating the principal bases and inorganic acids. This is followed by the analysis of various substances, either in solution or in solid form, the composition of which is unknown to the student. Considerable emphasis is laid upon the writing of equations expressing the reactions involved in the work. Credit, three hours.

D. **Qualitative Analysis.** Lectures and recitations T Th, 8, L. R. 2. Dr. LEMON. Laboratory work for students taking courses C and D with the intention of securing the equivalent of the regular University course 7. Daily, except Sat., 1.30–4.30, and M W F, 8–11. For students taking work in course D alone, afternoon periods only. Dr. LEMON and Mr. RIEGGER. Credit, one, two, or three hours. 1. A study in laboratory and class room of the methods of detecting each of the important acids in the presence of the others, together with the reactions involved, followed by the analysis of more complex mixtures than those assigned in course C. 2. A comparative study in the laboratory of different methods of detecting and separating the bases.

E. **Quantitative Analysis.** Elementary. Lectures, T Th, 11, L. R. 4. Laboratory, M W F, 8–11. Credit, two hours. Dr. LUNDELL and Mr. VANDER MEULEN.

An introduction to quantitative methods and the chemistry upon which these methods are based. Lectures, explanatory of the methods used, are first given; each student then performs simple analyses which involve the use of the apparatus ordinarily employed in analytical work.

Advanced work (see course F) may be taken by students who complete this course before the close of the session.

F. **Quantitative Analysis.** Advanced. Laboratory practice at hours to be arranged. Credit, one, two, three, or four hours. Dr. LUNDELL and Mr. VANDER MEULEN.

This course comprises instruction in certain gravimetric, volumetric, and electrolytic methods of analysis, and in the methods of combustion analysis. The work includes the analysis of iron ores, iron and steel, slags, paints, lubricants, coal and coke, cements and cement materials, alloys, ores of copper, lead, zinc, mercury, manganese, tin, etc.

[G. **Spectroscopic Chemical Analysis and Colorimetry.** Lectures and laboratory practice. University credit, three hours. Dr. ANDERSON.

The lectures are devoted to a description of the instruments used in the laboratory and to a detailed discussion of spectroscopic methods. Besides spectroscopic apparatus, various types of colorimeter, polariscope, and refractometer are considered, especial stress being laid upon the principles involved in their construction.

The laboratory instruction includes the following work: the observation and mapping of emission spectra of various elements in the Bunsen flame, the oxy-hydrogen flame, the electric arc, and the electric spark; the qualitative analysis of mixtures and minerals by the use of the Krüss spectroscope and the direct vision spectroscope; the observation and mapping of absorption spectra; the examination and identification of rare earths and of organic dyes in solution by means of their absorption spectra; the calibration of spectroscopes; spectrum photography; and practice in the use of colorimeters, polariscopes, and refractometers of various types.] Not given in 1913, but will be given in 1914.

H. **Qualitative and Quantitative Gas Analysis.** Lectures, daily, except Sat. 12, L. R. 3. Credit, two hours. Dr. ANDERSON.

A detailed discussion of many representative types of apparatus employed by the gas analyst, and of the various methods of analysis involved in their use. Numerous simple problems are assigned which afford practice in the calculation and interpretation of the results obtained in gas-analytical work.

I. **Technical Gas Analysis.** Laboratory practice at hours to be arranged. Credit, two hours. Dr. ANDERSON and Mr. A. R. HITCH.

The analysis of gas mixtures with the apparatus of Honigmann, Bunte, Orsat, Winkler, and Hempel; the complete analysis of flue gas; illuminating gas, generator gas, acetylene, and air; the determination of the heating power of gaseous, liquid, and solid fuels, and the analysis of various substances by gas analysis methods involving the use of the different types of gas evolution apparatus such as the Scheibler calcimeter, the Hempel and the Lunge nitrometer, the Lunge gasvolumeter, and the Bodländer gasbaroscope. Within certain limits the work may be selected to suit the requirements of the individual student.

Courses H and I should be taken at the same time.

J. **Organic Chemistry.** Aliphatic compounds. Lectures and recitations, except Sat., 8, L. R. 3. Laboratory practice at hours to be arranged. Credit, four, five, or six hours. Professor ORNDORFF, Dr. E. F. HITCH, and Mr. MAHOOD.

K. **Organic Chemistry.** Aliphatic compounds. Lectures and recitations. Except Sat., 8, L. R. 3. Credit, two hours. Professor ORNDORFF and Mr. MAHOOD.

These lectures and recitations are the same as those of course J. Course J should be taken in preference to course K whenever it is possible.

L. **Organic Chemistry.** Aromatic compounds. Lectures and recitations, except Sat., 10, L. R. 3. Laboratory practice at hours to be arranged. Credit, four, five, or six hours. Dr. E. F. HITCH and Mr. MAHOOD.

Courses J and L presuppose a knowledge of elementary chemistry, and L must be preceded or accompanied by J. These courses may be taken together or course J may be taken one summer and course L the following summer.

M. **Organic Chemistry.** Aromatic compounds. Lectures and recitations, except Sat., 10, L. R. 3. Credit, two hours. Dr. E. F. HITCH and Mr. MAHOOD.

These lectures and recitations are the same as those of course L. Course L should be taken in preference to course M whenever it is possible.

N. **Methods of Organic Analysis.** Laboratory practice with occasional lectures. Hours to be arranged. Credit, two or more hours. Professor ORNDORFF and Dr. E. F. HITCH.

This course comprises the qualitative and quantitative analysis of pure organic compounds, and of such commercial products as alcohols, ethers, organic acids, glycerol, formalin, acetates, soaps, turpentine, rosin oils, etc.

R. **Microchemical Methods.** Laboratory practice at hours to be arranged. Credit, two hours. Mr. SHERWOOD.

The aim of this course is to familiarize the student with the use of the microscope and its accessories, and with microchemical methods and apparatus as applied to chemical investigations.

S. **Microchemical Analysis.** Elementary course. Laboratory practice at hours to be arranged. Credit, three hours. Mr. SHERWOOD.

Practice in the examination and analysis of inorganic substances containing the more common elements with reference to rapid qualitative methods and the analysis of minute amounts of materials.

T. **Foods, Beverages, and Food Accessories.** Lectures. Credit, two hours. Except Sat, 9, L. R. 4. Dr. REDFIELD.

What constitute foods, and why; chemical standards for foods, and how these have been determined; general methods of food analysis; the relation of pure and adulterated foods to the public health; sterilization and preservation of foods; detection of adulterants; dietary standards, and the economic value of different foods.

U. **Food Analysis.** Laboratory practice at hours to be arranged. Credit, four hours. Dr. REDFIELD and Mr. MAHOOD.

The chemical and optical methods employed in the examination of foods, with reference to adulteration, imitation, and alteration; the examination of foods for artificial coloring matters, preservatives, and poisonous substances; a study of milk, comestible fats and oils, cereal products and starchy and saccharine foods, canned goods, jellies, etc. This course may be extended so as to include the analysis of alcoholic beverages.

[V. **Potable Water**. Lectures. Credit, two hours. Dr. REDFIELD.

Sources of potable water; how polluted; agencies at work leading to the natural or self purification of surface and ground waters, and what they accomplish; the data necessary for a decision as to the fitness of a water for household, municipal, and industrial use; the interpretation of the results of water analyses, chemical, microscopical, and bacteriological. Modern methods of water purification, disinfection, and sterilization.] Not given in 1913, but will be given in 1914.

[W. **Water Analysis.** Laboratory practice at hours to be arranged. University credit, three hours. Dr. REDFIELD.

The methods employed for the examination of waters with reference to their fitness for household, municipal, and industrial purposes, and for the testing of filters and water purifying devices for efficiency.] Not given in 1913, but will be given in 1914.

Z. **Teachers' Course.** Lectures and conferences, T Th, 2–5, and forenoons by appointment. L. R. 1. Professor HALE.

This course is especially designed to meet the needs of teachers of chemistry in secondary schools. Among the topics considered will be the spirit of the teaching of chemistry in the high school, the adaptation of chemistry to the needs of the pupils; the purpose of experimental work, both as demonstration and as laboratory work; suitable laboratory problems and the equipment adapted to the needs of the modern course in high school chemistry.

GEOGRAPHY AND GEOLOGY

The Lecture Rooms and Laboratories are in McGraw Hall. It is the purpose in this department to meet, primarily, the needs of teachers in grammar schools, high schools, normal schools, and colleges. A second aim is to provide courses of practical and cultural value to college students. The work embraces lectures, laboratory, and field instruction in physical, regional, industrial, and commercial geography; and in mineralogy, lithology, structural geology, and paleontology.

The environs of Cornell University are rich in phenomena of geographic and geologic interest. Consequently field excursions are made an especially important part of the work of this department in the Summer Session.

The laboratories are well equipped with apparatus and illustrative material for class instruction and research. As such may be enumerated teaching and reference collections of minerals, rocks, fossils, maps, photographs, models, and more than five thousand lantern slides.

Special Illustrated Lectures. These will be given by different members of the instructing staff on topics which have at once a wide, popular interest and lie also in the particular fields in which the lecturers have made personal investigations. These lectures are open to all students in the department and their friends. For the current session the following subjects are announced:

"Geographical Names and the Stories They Tell," by Prof. R. H. WHITBECK.

"Oklahoma," by Prof. I. PERRINE.

"Phenomena of the Yellowstone National Park," by Prof. O. D. VON ENGELN.

Round Table Conference in Geography and Geology. There will be three or four evening conferences for instructors and students in geography and geology, one each in charge of the several professors in the department. At these conferences discussions of important general topics relating to the teaching of geography and geology will take place. Sources of material, methods, ideals, and scope of these subjects will be considered. Those interested are invited to write to the several professors suggesting topics, etc., in advance of the session.

Attendance at these conferences is purely voluntary, but all students in the department are invited. This free interchange of views among teachers and students is expected to throw much light on problems of teaching and on working methods.

For entrance credit in Physical Geography a student is required to attend, complete all required work, and pass the examinations in courses: A, B, E, G, and H.

A. **Physical Geography.** An introductory course in general physical geography, covering most of the subjects treated in modern texts, except the atmosphere

(see course G). Some of the topics discussed are: principles of geography; structure and form of the earth; relief features; the ocean, its basins, deeps, islands, composition, temperature, movements, exploration, life, and navigation; shore line types, development, harbors; rivers and valleys; plains and plateaus, mountains; snow fields and glaciers; volcanoes and earthquakes. An attempt is made to describe the leading processes, to account for the land and water forms, and to show their consequences. The lectures are fully illustrated by lantern, maps, models, and specimens. Students registering in this course are advised to take also the related courses, B and E. M T W Th, 9. Geological Lecture Room. Assistant Professor VON ENGELN. Credit, two hours.

B. **Physical Geography, Laboratory Course.** The members of this class will make a systematic study of the Physiographic Regions of the United States using contour maps, models and the experimental laboratory of the department in a laboratory study of the subject. By such study the topographic, regional, and life relationships (human, animal and plant) of the geography of the United States will be correlated and presented as an orderly whole. The course will prove of worth to grade teachers of geography who wish to obtain a broader basis for their work in the subject, as well as for those who expect to teach geography in the high schools.

A laboratory fee of $1.00 must be paid to the Treasurer at the beginning of the session to cover laboratory maintenance. T Th, 2–4. Physical Geography Laboratories. Credit, one hour. Mr. ELSTON.

C. **Elementary Geology.** A general introductory course. Some of the topics discussed are: general features of the earth; the earth in space, its origin and relation to other heavenly bodies; igneous, sedimentary and metamorphic rocks; geologic structure, the geologic evolution of continents and ocean basins, the great periods of geologic history with special reference to the development and evolution of type life forms. Emphasis will be put on the evolution idea as exemplified in geological science by the origin of the earth and the appearance, development,and extinction of various organic forms. An appreciation of these things is of fundamental importance in a knowledge of nearly all modern science. The lectures are fully illustrated by lantern slides, models and specimens. Students are advised to take also the related courses, D, E and I. M T W Th, 10. General Geology Laboratory. Credit, two hours. Professor PERRINE.

D. **Elementary Geology, Laboratory Course.** In this course a laboratory study will be made of the most common rocks and minerals comprising the main mass of the earth's outer shell; of geologic structure as shown by contoured geologic maps and models; and of the life forms developed in each geologic period. Short field excursions will be made to collect specimens, especially fossils, from various horizons near Cornell University, where the rocks are especially rich in such remains.

T Th, 2–4, General Geology Laboratory. Credit, one hour. Professor PERRINE and Mr. TROUT.

A laboratory fee of $1.00 must be paid to the Treasurer at the beginning of the Session to cover laboratory maintenance expenses.

E. **Geography and Geology, Field Course.** This course should be elected by all those registering in course A or C, and is required of all those desiring university credit in those courses and also of those who desire entrance credit in physical

geography. With courses A and B it affords a comprehensive course in physical geography; with courses C, D and I it will give a similarly broad training in elementary geology, as the dynamic phases of geology are emphasized on the excursions. Mimeographed outlines of the excursions are to be secured by each student.

Students not registered in the course or department are invited to attend these excursions but must conform to the directions of those in charge. Those desiring University or entrance credit must take field notes and hand in written reports. Excursions 1–6 are required of all students in the course, and in addition they must make either two of 7, 8 or 9; or one of 10 and 11 for one hour's credit.

Meeting place and time announced in mimeographed outlines or by bulletin. Meet for first excursion Monday, July 7th, at Geological Lecture Room, McGraw Hall 2:30 P. M. Excursions 1–6, Monday afternoons; 7, 8, 9, all day Saturday; 10 and 11 Friday and Saturday.

Synopsis of the excursions is given at the end of the list of courses in the department.

F. **Industrial and Commercial Geography.** Adapted to the needs of teachers in high and grammar schools. The course includes a brief consideration of the history of commerce, the causes underlying the growth of industry and commerce, and a discussion of the distribution of the leading commercial products. A larger amount of time will be given to the leading facts of the industrial and commercial geography of the United States, the British Empire, Germany, France, Russia, China, Japan, Argentina, and Brazil. Each member of the class will make a study of some one selected topic and submit a report. Local excursions will be made for the purpose of studying certain industries at first hand. Museum materials and lantern slides will also be employed. Credit, two hours. M T W Th, 8, Geological Lecture Room, with additional time for conference and excursions to be arranged. Associate Professor WHITBECK and Mr. MORDOFF.

G. **Meteorology and Climatology.** Lectures and field observations; designed to meet the needs of teachers of physical geography; offers suggestions as to subjects of meteorological study that come within the scope of facilities afforded by public schools; where and how meteorological and climatological data may be obtained for school use; acquaints the student with the general circulation of the atmosphere; the development, progression, and conditions that attend cyclones, hurricanes, tornadoes and special storms; the construction of weather maps and climatological charts; practical weather forecasting from weather maps and from local observations; use and care of meteorological instruments; general and special climatology and its relation to agriculture. Special attention is given to the practical application of the principles of meteorology as exemplified by the work of the United States Weather Bureau and other similar organizations.

Lectures, M W F, 11. Geological Lecture Room. Credit, one hour. Dr. W. M. WILSON, Professor of Meteorology and Section Director of U. S. Weather Bureau.

H. **Meteorology and Climatology, Laboratory Course.** A systematic laboratory study with maps, charts, instruments, and a laboratory manual of the principal elementary weather and climatic phenomena. Tabulation of weather data and forecasting. Required of students desiring university credit in Course G and of students desiring entrance credit in physical geography.

Physical Geography Laboratories, W, 2–4.30 and outside hours. Credit, one hour. Mr. MORDOFF.

A laboratory fee of $.50 must be paid to the Treasurer at the beginning of the Session, to cover laboratory maintenance expenses.

I. **Minerals and Rocks.** An elementary course leading to an acquaintance with the properties and more important uses of the substances forming the earth's crust. Emphasis is laid upon the laboratory work, to which a large portion of the time will be devoted. Each student will be given about seventy-five minerals and a smaller number of rock specimens for identification by means of their physical properties. Some time will be spent in examining the large University collections of these same substances. It is thus possible to become familiar with the more common types by actually handling many specimens of each. Arrangements may be made with the instructor in charge for the purchase of a set of the minerals and rock specimens for school or private study.

Lectures, T Th, 11, General Geology Laboratory. Laboratory practice, W, 2–5, F, 9–12. Credit, two hours. Professor PERRINE and Mr. TROUT.

J. **Geography of North America.** This course is designed to give teachers of regional geography and others a broad conception of continental evolution and the geographic adaptation of North America for human occupation. The structure, physiographic history, topographic expression, climate, and natural resources of the different geographic provinces are considered in their relation to exploration, development, history, relation to industry and agriculture and to the location and growth of cities and routes of commerce. Needs, opportunities, and methods of conservation and reclamation are treated in their geographic relation. References and reading assignments to the literature of the subject on particular topics are given special attention. The course is fully illustrated with lantern slides, maps and models.

M T W Th, 10, Geological Lecture Room. Credit, two hours. Assistant Professor VON ENGELN.

K. **Aims and Methods in Geography.** Primarily for normal school and grade teachers. Lectures and discussions on such topics as Home Geography; the earth as a planet; Mathematical Geography; placing the emphasis; the plan and purpose of reviews and tests; thought, memory and drill work; the making and studying of maps; visual instruction; field lessons; supplementary reading; employing and directing children's geographical interests; the inter-relations of physical geography and human geography; the claims of commercial and of regional geography. May be taken for one hour credit. M T Th, 11, Geological Lecture Room. Associate Professor WHITBECK.

L. **Field, Research, and Teachers' Course in Geology.** This course is designed first, for those who desire to do field work in making contoured geologic maps, or in collecting and identifying fossils from the region about Ithaca; second, for advanced students wishing to do research work in fossils, etc.; third, for teachers who wish to become familiar with the literature of geology, especially of their home regions, or to outline courses adaptable for schools in their home regions. Hours to be arranged to suit the individual's needs. Credit, one or more hours. Professor PERRINE.

EXCURSIONS—SEE COURSE E

1. Campus and Vicinity. To study the work of streams and the development and form of valleys. Geologic processes and geographic forms resulting. In charge of Professors WHITBECK, PERRINE and VON ENGELN.

2. Eagle Hill. To become acquainted with the lay of the land about Cornell, and the broader physiographic features of the region, especially the maturely dissected plateau. Also a study of various phenomena of the processes of weathering and their applications. In charge of Professor WHITBECK.

3. Fall Creek and Deadhead Hill. To study the origin and nature of sedimentary rocks. Weathering, erosion, transportation, deposition, and cementation. In charge of Professor PERRINE.

4. Shore of Cayuga Lake. To study shore line phenomena, joint planes, bedding, and stalactites. In charge of Professor VON ENGELN.

5. Portland Point by Trolley. Expense $.50 to $.75. To study rock structure and character, fossil content, formation of residual soil, evidences of glaciation. In charge of Professor PERRINE.

6. Six Mile Creek. To study the effect of glaciation on a stream course. Relations to water supply and water power development. In charge of Professor VON ENGELN.

ALL-DAY EXCURSIONS

7. Cayuga Lake, Taughannock Gorge and Falls. By steamer. Expense about $.75. To study the Inlet Plain, the position and succession of the Devonian strata of the lake shore and the deep gorge and falls of Taughannock. In charge of Professors WHITBECK, PERRINE and VON ENGELN.

8. Enfield Gorge and Falls. By wagon. Expense about $1.10. To study the relations of preglacial valleys, interglacial and post glacial gorges, hanging valleys due to glacial erosion and morainic deposits. In charge of Professors WHITBECK, PERRINE and VON ENGELN.

9. Freeville. By wagon. For geography students and others interested. Union Springs. By boat. For geology students and others interested.

These two excursions will be conducted on the same day, or the Freeville excursion on Friday and the Union Springs excursion on the Saturday following.

FREEVILLE. To study the mature, upper Fall Creek valley, its glacial deposits, moraines, eskers, kames, and outwash material and their effects on agriculture. On this excursion a visit to the George Junior Republic is usually made. Expense about $1.10. In charge of Professors WHITBECK and VON ENGELN.

UNION SPRINGS. To study the Silurian and Devonian rock exposures along the shores of Lake Cayuga, collection and interpretation of fossils from the various horizons, and a study of the stratigraphy in its relations to economic geology. Expense about $1.10. In charge of Professor PERRINE.

LONGER VOLUNTARY EXCURSIONS

10. Niagara Falls. The two plains; the rapids; the cataract; the gorge; the buried gorge; the whirlpool; the abandoned fall at Foster Flat; the lower river; the strata of the gorge; the beaches of higher levels of Lake Ontario; the origin and history of Niagara; the influence of Niagara on industry. Opportunity will be given to visit the immense power plant and some of the factories that have

developed near the falls. At Niagara the class will constitute three sections, those primarily interested in commercial and industrial geography in charge of Professor WHITBECK, in geology, Professor PERRINE and in physical and regional geography, Professor VON ENGELN.

11. Watkins Glen. By railroad or automobile. Moraines and through valleys. A study of Watkins Glen, which is among the most beautiful in the country; a consideration of its cause. A comparison of Seneca and Cayuga lake valleys. Influence of these valleys on the industrial development of the region. Contrast with the upland. Geology students will be accommodated first in automobiles, after them others interested. Expense higher in automobiles. In charge of Professor PERRINE. Train excursion in charge of Professors WHITBECK and VON ENGELN. Auto and train parties unite at Watkins.

BOTANY

The Lecture Rooms and Laboratories are in the southeast wing of Sage College.

The courses are especially designed to aid teachers in their work with elementary classes, and at the same time to furnish information and training to those not intending to teach.

As much of the work as is practicable will be done in the fields and woods.

Three Saturdays during the session will be devoted to excursions to study special types of vegetation.

I. Aquatic vegetation, Cayuga, July 19. Expense about two dollars.

II. Peatbog and marl-pond vegetation, McLean, July 26th. Expense about seventy-five cents.

III. Ravine and woodland vegetation, Taughannock Gorge. Expense about fifty cents.

All students desiring credit in any of the courses in botany must participate in at least two of the Saturday excursions.

It is desirable that students taking courses C, D, E, and G, should have had some previous training in botany. Lectures in the various courses will be illustrated with photographs, lantern slides, projection apparatus, and as far as possible with living material.

A. **Physiology and General Morphology of Plants.** A general elementary course in botany. The aim of the earlier part of the work will be to familiarize the student with the general principles underlying the processes of absorption, nutrition, growth, etc., in plants, as well as with the methods of performing experiments to illustrate these phenomena. The latter part of the work will be devoted to a comparative study of the form and reproduction of representative species of all the great plant groups; algae, fungi, liverworts, mosses, ferns, gymnosperms, and angiosperms. Emphasis will be placed on the homologies of the vegetative parts and organs of reproduction. Lectures, M W F, 8. Laboratory, M W F, 9–12. One oral review weekly at an hour to be fixed. University credit, three hours. Dr. EAMES.

See excursions announced above.

B. **Special Morphology and Identification of the Higher Plants.** A comparative study of the vegetative and floral structures of the angiosperms. Types are selected representing the various groups of the angiosperms. These will be

studied from the point of view of their comparative form and their adaptation to special functions. Field studies will be undertaken for the purpose of illustrating and amplifying the work done in the laboratory. Excursions from time to time will be made to localities near by. Drawings, notes, and photographs will be utilized in connection with the course. Lectures, T Th, 8. Laboratory and field work, T Th, 9–12. University credit, two hours. Mr. BROWN.

Students taking the laboratory work in Botany A and B and desiring to take lectures in any of the other courses, will be excused from the laboratory during the necessary hours.

C. **Morphology and Classification of the Cryptogams.** a. The morphology and classification of mosses and ferns. A course in collection and identification, and a study of some life histories in the laboratory. The cryptogamic flora of Ithaca and vicinity is especially rich.

b. Embryology. Properly prepared students may make a study of certain phases of the embryology and development of typical plants of the above groups, or of the gymnosperms or angiosperms, if desired. Work will be assigned to suit individual needs.

All students taking this course will be required to join excursions II and III. Lectures, M W, 12. Laboratory and field work, M W, afternoons. Dr. EAMES. Credit, two hours.

D. **Trees and Shrubs.** (**Taxonomic and Biological Study of Trees.**) The tree as an organism which has adapted itself to special conditions in nature. In studying the kinds of trees, their adaptation to special conditions will be kept constantly in view. Much of the work will be done in the field. The sylvan conditions in the immediate vicinity of the University afford a fine opportunity for acquiring familiarity with many kinds of trees growing under a variety of conditions. A brief study of the structure and development of wood will also be undertaken. Excursions II and III are required. Lectures, T Th, 2.30. Laboratory and field work, T Th, afternoons. University credit, two hours. Mr. BROWN.

E. **Ecology of Plants.** A study of the relation of plants to their environment, including the following topics: adaptations, both external and internal; environmental factors; sequence and growth in plant societies; training in ecological methods. Lectures, laboratory, and field work. Frequent short excursions will be made. Special attention will be given to teachers of nature study who desire to obtain more information regarding the adaptations of plants. Students having sufficient preparation may elect some special problem in histological ecology. Excursions I and II are required. Lectures, W F, 2.30. Laboratory, M W F, afternoons. University credit, two hours. Professor ROWLEE.

G. **Organography and Identification of the Higher Plants.** A study of the kinds of plants with special reference to morphology, identification, habitat, and range of species. Extra field work will be substituted for some of the lectures. An herbarium will be prepared if the student elects to do so. Excursions I and II are required. Lectures, T Th, 2.30. Laboratory and field work, T Th, afternoons. Credit, one hour. Professor ROWLEE.

ZOOLOGY

A. **General Zoology.** An elementary course designed to meet the needs of teachers and those wishing to gain a general knowledge of the subject. The earlier part of the course aims at familiarity with the fundamental principles of animal functions and morphology. In addition the course deals with a comparative study of development and structure, systematic position, habits and life-histories of animals. The laboratory periods will be devoted to a study of their form and structure. As far as possible every phase of the subject will be illustrated by a study of the living animal. Lectures, except Sat., 9. McGraw Hall, Room 5. Five laboratory periods, except Sat., 2–5.30. Laboratory fee, $5.00. Credit, five hours. Assistant Professor REED and Mr. GILMORE.

B. **Ornithology.** A course concerned with the various phases of bird-life. The lectures will discuss such subjects as migration, coloration, molt, habits, nests, eggs, care of young, structure and toponomy, flight, general bird-ecology and ecologic groups, bird photography, preparation of study material, economic importance, methods of attracting birds, protection, game propagation and conservation and geographical distribution. The aim of the field work is the identification of birds in their haunts and observations upon habits. Representatives of the important families of North American birds will be studied in the laboratory with the aid of a manual. Each student should be provided with Chapman's Handbook of Birds of Eastern North America and with field or opera glasses.

Lectures, T Th, 11, McGraw Hall, Room 5. Laboratory is open except Sat., 2–5. Field work in two sections: T Th, 5–7.30 p. m., W F, 5–7.30 p. m. Credit, three hours including lectures, two laboratory and field periods of two and one-half hours each. The lectures may be taken separately or any combination may be made according to the needs of the student. Assistant Professor REED and Dr. ALLEN.

C. **Advanced Work.** An opportunity for advanced work and research is offered to those who are qualified. The laboratory will be open from 8 to 5 except Saturday.

PHYSIOLOGY

A. **Lectures upon the Elements of Physiology.** The lectures aim to present the fundamental facts of general and mammalian physiology, with particular reference to the functional activities of the human organism in health. The principal topics dealt with are the cell and the elementary manifestations of life, the blood and circulation, respiration, foods and their digestion, excretion, metabolism, the nervous system, and the special senses. Except Sat., 10, Stimson Hall, Amphitheater. Credit, two hours. Assistant Professor HUNTER.

B. **Elementary Practical Physiology.** A short course of demonstrations and individual experiments covering the gross and minute structure of the body, the composition of living things, blood, foods, digestion, etc. The course includes most of the experiments and demonstrations in physiology called for by the Syllabus of the State of New York. M W F, 11–12.30, Stimson Hall, Physiology Laboratory. Credit, one hour. Assistant Professor HUNTER and Mr. GIVENS.

C. **Experimental Physiology.** Technical laboratory work in amphibian and mammalian physiology. The course will cover: (a) muscle and nerve; (b)

heart and circulation; (c) respiration; (d) vision. Except Sat., 8–11, Stimson Hall, Physiology Laboratory. Credit, three hours. Assistant Professor HUNTER and Mr. GIVENS.

D. **Advanced Work.** Opportunity for advanced work and research in physiology and biochemistry is offered to those properly qualified. The laboratories are open daily from 8 a. m. to 6 p. m.

SHOP WORK AND DRAWING FOR ENGINEERING STUDENTS

Drawing

For further information regarding course C, apply to Professor Pond; for information regarding the drawing and shop courses apply to Professor Kimball, 205 Sibley.

A. **Mechanical Drawing.** A course in drawing for beginners, covering use of instruments, orthographic and isometric projection, inking, tracing, conventions, working drawings, M W F, 8–11 and except Sat., 2–5, Sibley 203. Mr. WILLIAMS.

B. **Machine Sketching and Drawing.** A more advanced course in mechanical drawing for those who have had the equivalent of course A. Sketching of machine parts, machine drawing from sketches, empirical design. This course is an application of the work in course A to such machine designing as can be done without a knowledge of mechanics. M W F, 8–11 and except Sat., 2–5, Sibley 203. Professor KIMBALL and Mr. WILLIAMS.

C. **Descriptive Geometry.** Lectures or recitations, daily except Sat., 8, Drawing, daily except Sat., 9–12. Lincoln Hall. Assistant Professor POND.

Equivalent to descriptive geometry of course 1 as given in the regular college year, and accepted for the descriptive geometry required in Sibley College and in the College of Civil Engineering. Those who require Sibley credit do not need to take the whole course.

Shop Work

A. **Pattern Making.** Use of woodworking tools; elements of pattern making. Mr. HOOPER.

B. **Foundry Work.** Moulding, casting, mixing of metals, operation of cupola, etc. Mr. VANDERHOEF.

C. **Forge Work.** Forging, welding, tempering, etc. Mr. HEAD.

This course will be given only if the registration is large enough to warrant offering it.

D. **Machine Work.** Use of measuring tools; hand and machine tools; fitting and assembling.

Each of the above daily except Sat., 8–11, 1–5, and Sat., 8–11. Mr. WELLS and Mr. HOWE.

E. **Manual Training.** The scope of the foregoing courses in shop work is the same as that of the corresponding courses given to the regular Sibley College students. They are intended for prospective or actual engineering students. In addition to these, special courses are offered in each shop, designed to meet the wants of manual training teachers, and given in close connection with the

technical work of manual training. (See pp. 16, 17.) Teachers having special needs may have courses made up to suit their wants. At the same time it is greatly to their advantage to see the work as given to the regular engineering students.

MECHANICS OF ENGINEERING

A. **Mechanics.** This course is considered the equivalent of the first term of course 20 College of Civil Engineering, and is designed primarily for those students in Cornell University who have taken the first term of course 20, **or its equivalent,** in regular University classes, but have received a condition therein. This means that they must have received a mark of at least 41. Students other than those mentioned above must satisfy the professor in charge that they are qualified to take the work before they can be registered in this course.

Lectures, recitations, and problems, two hours daily except Sat. 8–10. Credit, five hours. Lincoln Hall 24. Assistant Professor RETTGER and Mr. POWELL.

B. **Mechanics.** This course is considered the equivalent of the second term of course 20. The conditions of admission are similar to those for Mechanics A above.

Lectures, recitations, and problems, two hours daily except Sat., 10–12. Credit, five hours Lincoln Hall 24. Assistant Professor RETTGER.

C. **Engineering Problems.** Credit, two hours. Preparation required: Mechanics 20 and Hydraulics 23, or their equivalents. This course is the equivalent of course 29, College of Civil Engineering Computations and reports. Three hours daily except Sat. Lincoln Hall 24. Assistant Professor RETTGER and Mr. POWELL.

BRIDGE AND STRUCTURAL ENGINEERING

C.E. 71. **Structural Design.** Credit, two or four hours. Preparation required: Mechanics 20. One half of the course includes structural details, or the design of a wooden roof truss and of other timber joints. The other half of the course includes bridge stresses in simple trusses due to dead, live, and wind loads, initial tension and impact, and for both panel loads and locomotive axle loads. Lectures, recitations, computation, and drawing. Except Sat., at hours to be assigned. Lincoln Hall 22 and 29. Messrs. BURROWS and URQUHART.

C.E. 72. **Reinforced Concrete Arch.** Credit, three hours. Preparation required: Mechanics 20, and that portion of course 71 which deals with elementary graphic statics. The design of an arch of reinforced concrete including the abutments and centering. Lectures, computation, and drawing. Except Sat., at hours to be assigned. Lincoln Hall 4. Messrs. BURROWS and URQUHART.

This course may be substituted for Engineering Design, C.E. (91 f).

C.E. 77. **Concrete Construction.** Credit, three hours. Preparation required: Mechanics 20. Textbook, Principles of Reinforced Concrete Construction by Turneaure and Maurer. The object of this course is the study of the fundamental principles underlying the rational design of reinforced concrete structures including centering. Except Sat., at hours to be assigned. Lincoln Hall 14 and 29. Messrs. BURROWS and URQUHART.

HYDRAULICS

The instruction in hydraulics given in the Summer School is intended primarily for students in Cornell University who have failed to obtain a passing mark in the subject during the regular term, and for those students in Sibley College who have been unable to take the work of the regular course on account of conflicts or pressure of other work. The scope of the work in the Summer Session is identical with the regular courses 23 and 24 in Civil Engineering, save that the laboratory demonstrations are omitted. For the convenience of students in Sibley College who desire to take hydraulics in the Summer Session, the work has been arranged in two parts allowing the students in mechanical engineering to omit that part pertaining to hydrostatics, and to restrict themselves to the study of the flow of water and to hydraulic motors. Students desiring the equivalent of C.E. 23, five hours credit, will take all the work, meeting eleven times a week in one-hour periods, twice daily except Saturday, and once on Saturday. Students desiring the credit of two hours for the equivalent of the Sibley requirement will meet once each day six times a week, in one hour periods. Sibley students must receive the approval of Professor Diederichs before registering. Students who contemplate taking hydraulics in Summer Session should register in advance with Assistant Professor SEERY, 33 Lincoln. For convenience of instruction and administration the course is divided into two parts.

Course A. Hydrostatics; measurement of pressures; strength of pipes; dams and retaining walls; earth pressures; immersion and flotation; pneumatics of air motors and compressors; barometric levelling; etc. Daily except Sat., 12. Lincoln 21. Assistant Professor SEERY.

Course B. Hydraulic motors and flow of water through pipes and orifices and over weirs; fluid friction and loss of head; general applications of Bernouilli's Theorem; steady flow in open channels; use of Kutter's and Church's Diagrams; hydraulics of machinery; waterwheels; impulse wheels; reaction turbines; theorem of flow through rotating casing; power, speed, and discharge of turbines; theory of testing of motors, etc. This course corresponds exactly to C.E. 24 and the Sibley course in hydraulics. Daily, 8. Lincoln 21. Assistant Professor SEERY.

INDEX

	Page
Admission	5
Board and Rooms	7–8
Botany	45–46
Bridge and Structural Engineering	49
Calendar	2
Certificates of Work	7
Chemistry	36–40
Concrete Construction	49
Cost of Living	7
Credit for Work	6
Descriptive Geometry	48
Design	17
Drawing and Art	17–48
Earth Science	40–45
Economics	26
Education	10–17
Engineering	48–50
English	18–20
Excursions	8, 44, 45
Expenses	6, 7, 8
Faculty	3, 4
Fees	6
French	21
General Lectures	6
Geography	40–45
Geology	40–45
German	22–24
Graduate Work	7
Handwork	16, 48
History	25, 26
Hydraulics	50
Industrial Education	13–17
Invertebrate Zoology	47
Laboratory Fees	6
Latin	24, 25
Libraries	8
Living	7, 8
Manual Training	16, 17, 48
Mathematics	32–33
Mechanical Drawing	17, 48
Mechanics of Engineering	49
Meteorology	42
Music	27–32
Object of Session	5
Ornithology	47
Physical Geography	40–45
Physical Training	13
Physics	33–36
Physiology	47, 48
Political Science	25
Psychology	11, 18
Railroad Rates	9
Registration	5
Sage College	8
School Administration	12
Shop Work	48–49
Spanish	21
Speaking and Reading	20
State Examinations	10
Tuition	5
Vertebrate Zoology	47
Voice Training	20
Zoology	47

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